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Ref. CW 940

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INTERNATIONAL BRIEFING

Joint venture in Yugoslavia

YUGOSLAVIA is to acquire Western computer technology, and following establishment of a joint venture between Iskra and Control Data to manufacture the Cyber 18 minicomputer line under licence (CW, June 30, 1977). Honeywell Italia is now close to agreement with Elek, a Yugoslav electrical goods manufacturing undertaking, for a joint venture to manufacture the top six models of the Level 6 minicomputer line.

They will be built in Nis by a new company, El-Honeywell Informacioni Sistem, owned 63% by El, 30% by Honeywell and 7% by Honeywell's Yugoslav agent, Progres.

Amdahl installed

THE first Amdahl 470V/7 for American Airlines' Tulsa, Oklahoma computer centre, exclusively revealed in Computer Weekly (January 12), has now been installed, and the big internal US carrier has a second on order for next March. The machines will ultimately take over from the airline's two V/6s, but it will not become an all-Amdahl shop. Several 3030 series processors are reported to be on order from IBM.

Redifon for Tokyo

A THIRD Boeing 747 flight simulator has been ordered from Redifon Simulation by Japan Air Lines, for installation at the flight crew training centre at Haneda Airport in Tokyo. This sale brings the value of Redifon exports to the airline to almost £15 million.

Classic

TWO orders for Modcomp Classic 7800 computer systems have been placed by West German customers. Aachen Technical High School is spending \$200,000 on a large system which includes two Modac III 7810 satellites and will replace a Xerox Sigma 3. The other customer is Brinkmann GmbH, a cigarette manufacturing company in Bremen, which has ordered a \$100,000 system for tobacco research.

Japanese order

TWO of Univac's top-of-the-line 1100/80 systems have been ordered by Kawasaki Steel, the Japanese steel firm, to supplement the systems it runs on two Univac 1110s. Worth \$15.8 million, the two computers are dual processor 1100/82 models, and will be used for sales and management information, and on-line control.

Printer finances

SECOND quarter revenues of \$38,387,000 are reported by printer manufacturer Data-products Corp, representing an increase of 21 per cent over the corresponding period of the previous year. But income declined by 12 per cent, primarily due to heavy start-up costs on three new product lines.

COMPUTER WEEKLY International

NUMBER 88

THURSDAY, NOVEMBER 9, 1978

NOVEL METHODS OF DATA TRANSMISSION ARE SOUND TO CROP UP FROM TIME TO TIME. DON'T LET NEWLY HATCHED IDEAS EGGO YOU ON TO BIRD BRAINED SCHEMES.

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European electronics market 'worth \$48 billion'

THE total European electronics market for 1978 is predicted to be worth \$48 billion in a new report. Another report covering a small part of that market, data communications, predicts a cumulative total over the ten years from 1977 to 1987 of \$4.2 billion.

Mackintosh's Electronics Yearbook shows that computers and communications equipment are the two fastest growing sectors of the European electronics market, both showing a 24 per cent increase in 1978 over 1977. This is said to reflect innovation in product development and the penetration of com-

puter applications into all parts of the economy.

In production of computer systems, the UK and West Germany are shown to be going from level pegging at \$1 billion production in 1976 to Germany's production nearly 50 per cent up on the UK's in 1977. The predicted 1979 figures are \$1.4 billion for the UK and \$2.6 billion for West Germany.

The respective computer systems market sizes show a similar pattern, with the UK going from 81 per cent of Germany's 1977 value of \$1.6 billion, to 58 per cent of its \$3.3 billion 1982 figure.

The whole European electronics mar-

ket was \$41 billion in 1977 and is expected to grow by 17 per cent to \$48 billion this year. In the early 1980s Mackintosh expects growth of 6 per cent a year, with the market reaching \$62 billion in 1982.

Frost and Sullivan's report predicts that the European independent data communications market will peak and then begin to fall off by the early 1980s. This pattern is similar to forecasts for the US published last year, which predicted a peak of \$1.2 billion a year before the fall-off began.

The report suggests that the build-up will be brought about in part by the diversification of devices taking the

communications processing load away from mainframes. PTTs and value-added networks are increasingly using "node computers" to serve as concentrators and interfacing elements, as well as message switches and multiplexers.

*Mackintosh Yearbook of West European Electronics Data 1978, 140pp, price £75 or \$180 overseas, from Mackintosh Publications Limited (CW), Mackintosh House, Napier Road, Luton LU1 1RG.

*Data Communication Equipment Market in Europe, report E220, 703pp, price £438 or \$875, from Frost and Sullivan Limited (CW), 104-112 Marylebone Lane, London W1M 5FU.



Italian 'revolution'

ITALIAN cement company Cementir-Cementaria del Tirreno, a member of the IRI-Finlaser group, has revolutionised its data processing procedures with the installation of a new computer system. It is based on twin Honeywell Level 62 processors and supports dozens of terminals in sales offices and factories.

The system is used mainly for real time processing of sales, shipping, billing and customer accounting data. An important benefit of the system is the way it helps the factories via the terminals, one of which is shown in our picture.

The central system in Rome transmits a delivery plan to the factories every day. The factories then use the terminals to transmit details of each loading, and a few seconds later the necessary shipping documentation is printed out.

Datsaab close to sales deal with Univac

TALKS between Datsaab and Univac on marketing by the latter of the Datsaab D18/10 banking terminal series in some countries, are close to a successful conclusion, writes our Swedish correspondent.

The talks have been going on for 18 months, and involve joint bids in countries where Datsaab is strongly represented, and marketing by Univac where Datsaab is not active.

Univac collaborated with Datsaab on the bid for terminals to attach to the Univac 1100/80 mainframe ordered by Trustee Savings Banks in the North of England. This contract eventually went to Burroughs (CW, April 27).

Following the merger of the

Datsaab division of Saab-Scania with Stansaab to form Datsaab AB, it has been found necessary to cut back the workforces in Sweden. At the former Stansaab company just outside Stockholm, 99 employees have been declared redundant, while 43 redundancies have been declared in the Datsaab offices in Linköping.

Nigerian stake

IN a significant departure from the company's usual practice, IBM is to take a minority 40% stake in a new Nigerian company, Data Processing Maintenance and Services Ltd, formed to take over maintenance of IBM computers in Nigeria and to operate the company's bureaux.

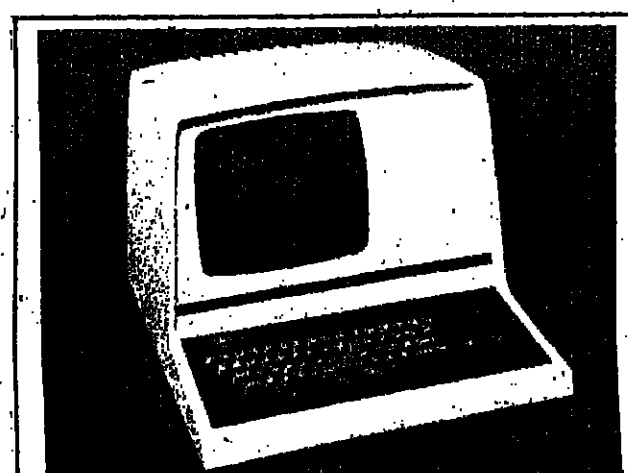
Time to buy?

THE American public is being given its first opportunity to buy shares in Scientific Time Sharing Corp, best known for its APL timesharing service. Over 600,000 shares are on offer at \$9.50 each. The money will be used to pay off long-term debts incurred when buying computer equipment.

Under starter's orders

QUICK off the mark with a bid to secure one of the prestigious Moscow Olympics Games contracts is Computer Instrumentation Limited. The company took a Cilecom 1600 computer output microfilm system to a Moscow trade show last month and hopes as a result to secure an order for four of those systems.

The 1600 system uses 16mm film and 800 bpi tapes, and is capable of recording more than 80,000 pages of output in a normal working week. It could readily be used therefore, to process the mass of statistical data which will emerge from the many Olympic events.



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Phone phreaks spurred by home computers

IN the past, phone phreaks carried out their electronic mischief with the aid of red boxes, blue boxes and black boxes. But now, a new and much more formidable weapon has been adopted by these pirates of the wires. It is called a beige box.

According to the purists, the beige box is a computer terminal equipped with a modem, and it is named after the Model 33 Teletype, parent of today's computer terminals. More generally, a beige box may mean either a terminal or a personal computer.

The beige box may be used to access the Western Union teletype network, telex circuits and certain satellite communications lines. A personal computer, enhanced with an interface capable of generating pairs of tones, can manipulate both the teletype networks and the telephone system.

The reference to the use of a computer terminal for electronic pranks will appear in a forthcoming issue of TAP, the phone phreaks' newsletter. The report in TAP, according to our sources, was prepared by a knowledgeable phreak with considerable expertise in telegraphic communications. Should the phone phreaks choose telegraphic systems for their mischief, the effect could be catastrophic.

There are thousands of personal computers and computer terminals in the hands of Americans, and the number of systems is growing exponentially. It is said that it would take no more than 30 minutes to teach a computer buff how to access the Western Union nationwide teletype network, and to go from there across telex lines to the rest of the world.

The ease with which unauthorised persons can

gain access to America's teletype system is largely due to an oversight in the Western Union network. Dial-up numbers of Western Union's Infomaster computers are reported to be in the hands of many phone phreaks, and this facilitates access to the entire network.

According to sources in the technological underground, Western Union's computer sends a signal to terminals that have dialled in that triggers an automatic answer-back code. This code identifies the terminal to the system for billing purposes. However, the Western Union system does not check whether an answer-back message of the appropriate length and format is received during a specified time period. Thus any answer-back may be typed on the terminal.

Even if Western Union checked the answer-

back for validity, the company has no way of preventing a phreak from using a computer to back up any authorised user and gain access to the network. In that case the user whose back was used would be billed for the service.

Personal computers may be used to simulate telegraphic terminals. With the specific interfaces, however, those same computers may be used to simulate the telephone system's central switching circuit.

The frequencies used by telephone network apparatus are well known in the underground, and the frequencies of the signals and tones are clearly described in telephone company technical papers that may readily be obtained.

Looking beneath IBM's impressive results

ECONOMIC concerns continue to plague investors, and despite indications that the computer industry, led by IBM, is shipping record levels of equipment, the Wall Street stock market remains tentative.

Of course, IBM's stock is of particular interest to big investors. The company announced record earnings for the quarter (CW, October 19), but the stock, which had risen earlier in anticipation of good news, dropped sharply.

While there is an old saw about the stock market always rising on fantasy and falling with facts, the real reason for IBM's dropping share value may have been investors' second look at the company's generally impressive figures.

"Most analysts saw the bottom line first," says Evans and Co's Eugene K. Collins, the prestigious firm's computer industry analyst. "Then we broke the numbers down and found that currency transactions made an extraordinary contribution to the gains."

The figures were indeed impressive: Revenues for the quarter rose 15 per cent to \$5,380 million while earnings reached

\$815.9 million, an 18 per cent jump. (Last year's figures were \$4,500 million and \$690.4 million, respectively.)

And for the first nine months of the company's current fiscal year, IBM booked a profit of \$2,100 million, up 9 per cent from last year's \$1,920 million. This shows an impressive recovery from earlier quarters in which IBM profits slipped, a phenomenon attributed by stock analysts to the start-up of 303X shipments.

All this shows that IBM is a strong and growing company, able to introduce impressive products that slash the cost of data processing and somehow maintain great profitability.

But the catch comes in reported changes in IBM's income from currency transactions. The multinational lost \$36 million in currency exchanges during the first nine months of 1977, and gained \$99 million during the same period of the current year, a difference of \$135 million that contributes directly to profits and losses.

Clearly money made or lost in currency transactions is no different from money made or lost through the sale of goods or

services. However, such money is not completely controlled by a multinational corporation; it is largely the result of currency fluctuations that result from international economic policies. Thus the falling dollar created a situation that contributed to IBM's profits so far this year, and IBM's only control over its reported income (or loss) would come from the rate at which the corporation chooses to repatriate funds from its overseas operations, a rate that itself may be determined by taxation policy and other regulations as much as by the policies of the company's management.

If the currency gains and losses are separated from other business figures, IBM's performance does not reflect the dramatic profit improvement that the reported bottom line figures indicate.

In the first nine months of 1977 IBM's profit was \$1,958 million before currency losses; in the first nine months of 1978, the company earned \$2,001 million before currency gains were added. Thus IBM's profits from the

sale of goods and services did not grow 9 per cent from year to year but actually grew only 2.3 per cent.

This situation by itself will not cause investors to bail out of IBM stock, however, because the company's rate of sales is very high and the fourth quarter should reflect continued gains in both currency transactions and profits on sales. Further, the company may split its stock and further increase its dividend payout later this year, moves that would bring smaller investors into the ranks of IBM shareholders.

Investors show their faith in computer business

VALUES of the shares of computer companies have done well this year, outperforming the stocks of just about every other industry and the stock market as a whole.

The faith that investors have shown in the profitability of the computer business is illustrated in a study published by Evans and Co, the brokerage firm. The figures below, drawn from a long list published by the brokerage, demonstrate how various computer companies have fared with investors. The Standard and Poor's index used as a comparison is a broad indicator and includes the stock

prices of 400 companies. These selected mainframe and peripheral companies, with the exception of IBM and Burroughs, dramatically outperformed the market. Some of the best performers were companies whose fame rests in part on aggressive competition with IBM in the courts as well as in the users' offices.

It should be noted that the same companies whose shares grew so rapidly decline dramatically when Wall Street loses faith in computer companies. IBM and Burroughs generally suffer less from such a loss of confidence.

SHARE PRICES

Company	Dec 31	Sept 30	Per cent Change
S&P 400 Index	104.71	113.71	8.6
Burdahl	27 3/8	54 7/8	100.5
Burroughs	72 7/8	77 5/8	6.5
CDC	28 3/4	37 1/4	28.7
Cray	30 1/4	66	118.2
Honeywell	45 7/8	64 3/8	40.3
IBM	273 1/2	277	1.3
IBM	40 3/8	30 3/8	40.5
Sperry Rand	36 1/2	44 3/4	22.6
Calcomp	27 1/8	11 3/8	208.7
Controlics	17 5/8	35 1/8	99.3
Itel	20 1/4	32 1/4	58.3
Storage Tech	10 7/8	30 3/8	179.3
Memorex	31 3/4	48 3/4	53.5

NEWS FROM AMERICA BY HESH WIENER



Crunch on the Apple

AN Apple computer, supposedly modified for use by phone phreaks, played a significant role in the latest drama surrounding John T. Draper, known as Captain Crunch.

Phone Phreak Crunch has been imprisoned again and is serving three months at East Pennsylvanian's Northampton County Prison (pictured above) on charges of unauthorised use of telephone services resulting from his access to what is called a WATS extender.

A WATS extender is a telephone number that permits the caller to dial outgoing calls for a flat rate. It is used by businesses so that personnel may call a local number at the public dial-up rate and then dial an access code and a new number to get connected anywhere in the US.

Captain Crunch was on probation stemming from a previous phone phreaking charge when his arrest and conviction ensued. While the present charge does not involve phone phreaking, there is a possibility that Crunch's probation could be revoked, sending the Captain back to federal prison for up to 15 years.

When Crunch was arrested, according to phone phreak phlogistors, AT&T went over his

modified Apple II computer carefully. Phone phreaks have claimed Crunch had developed some software and hardware that might be used by phone phreaks. Crunch's software was a complicated, according to phlogistors, under the underground, that will scientists spent weeks trying to document it. The code was lying the software was a limited in hundreds of thousands of dollars by underground phlogistors. And whether the code actually found Crunch's remains unknown.

CORAL NEWS

The International edition of Computer Weekly dated October 12, 1978, carried text from the first CORAL NEWS.

The correct text appeared on October 12, 1978, and copies are available from the Press Co-ordinator, NCC, Manchester.

Hitachi cuts risk with leasing policy switch

ANALYSIS of the marketing methods of Japanese companies in their home market indicates that the reported sales revenues of the Big Six Japanese mainframe manufacturers—Fujitsu, Hitachi, NEC, Toshiba, Mitsubishi and Oki—are not as firm as they seem, and Hitachi has now decided to do something about it.

In 1962, the Big Six set up a jointly owned leasing company, JECC, Japan Electronic Computer Co (CW, July 27).

JECC is funded with low-interest loans from government-backed financial institutions, and handles substantially all mainframe leasing in Japan, apart from IBM's own business there.

When a provisional leasing contract is signed between a manufacturer and a customer,

the manufacturer sells the machine outright to JECC and marks the transaction down as a sale in its books. This is attractive to the manufacturer, in that he gets cash in hand at once, and convenient for the user, in that he deals with one large and reputable finance company.

However, there is a major snag. If the customer terminates his lease before the prescribed period, the manufacturer is required to buy back the machine at a substantial proportion of its original selling price. The Japanese manufacturer is therefore compelled to go for extremely rapid growth in sales in order to keep ahead of the game; and, in Fujitsu's case, in particular, resorts to aggressive price-cutting to keep the new business coming.

Thus, although Fujitsu's es-

timated 19% of the Japanese market is not far off IBM's estimated 24%, Fujitsu's annual revenues of some 240,000 million yen are much "softer" than IBM's 300,000 million yen, since the IBM figure is actual on-going rentals received, whereas Fujitsu's contains a significant element of money received for machines which it might have to buy back at any time.

Hitachi, with annual computer sales of about 170,000 million yen, has recognised the risks involved in this exposure, and has switched to a policy of financing many of its rented machines internally, rather than through JECC; 50% of its sales are now financed in this way.

Some observers in Japan believe that this is evidence that Hitachi has a better understanding of the computer business than its competitors, and that in the long term it is in better shape to survive than its partner in the M-series, Fujitsu.

Hitachi's semiconductor tech-

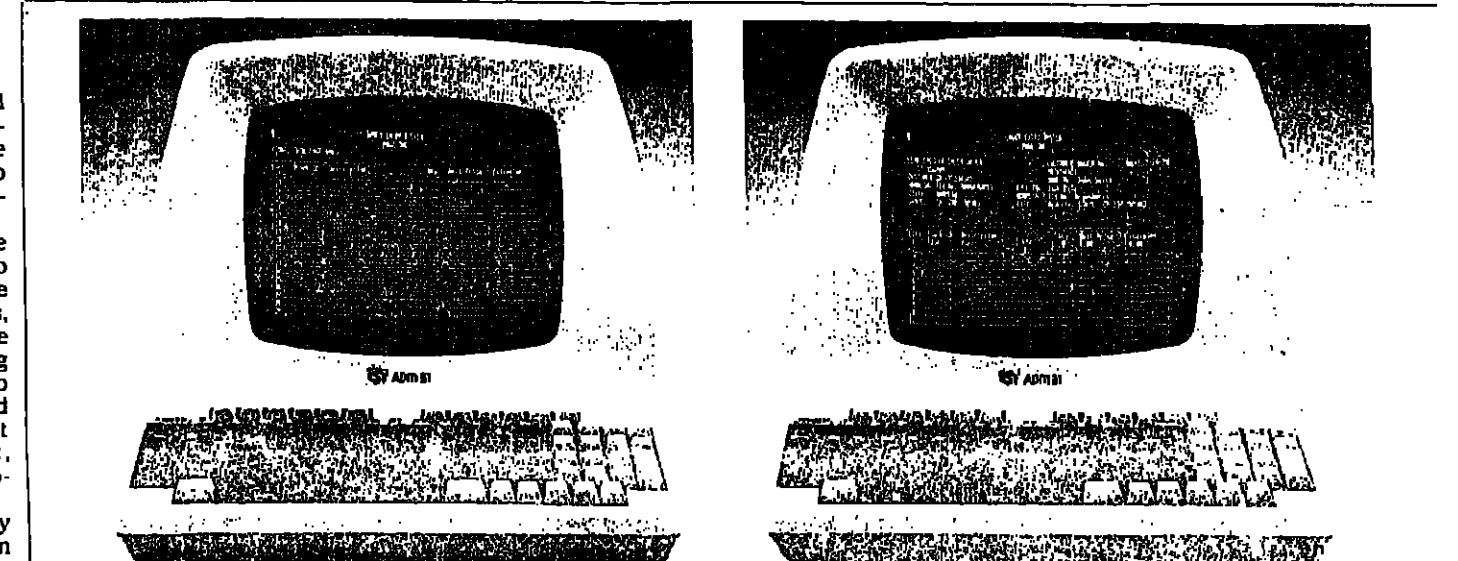
nology is particularly highly regarded in Japan, and the company is a giant, with computer business accounting for only 15% of its total. Fujitsu's computer business, on the other hand, accounts for about 70% of turnover, so the company has to succeed in the computer industry to survive. Normally regarded as a strength, this could turn out to be a mortal weakness if too many contracts with JECC were to turn sour.

Even if Fujitsu failed, it is unlikely that this would have much effect on its US partner Amdahl. After using Fujitsu as a springboard to get its production up and running, Amdahl has been transferring more and more of this back to California and now depends very little on Fujitsu.

On the other hand, if Hitachi lives up to the expectations of Japanese industry observers, it will prove a very significant partner for Intel, which is entirely dependent on Hitachi for its large systems.



FOLLOWING the agreement between BIS Software and Toppan Moore of Tokyo under which the latter will market the BIS-MIDA International banking system in Japan (CW, September 14), two Japanese salesmen, Mr. Matsumoto and Mr. Asada are visiting London to learn the ins and outs of the software, which runs on IBM System 32 and System 34 computers. The picture shows them studying a printout.



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As if that isn't enough, the keyboard includes a caps lock key (to lock the keyboard into upper case only).

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ADM 31

Two pages are better than one

US business group emphasises privacy

IN an effort to "raise the consciousness of business on privacy issues," the US National Chamber of Commerce has adopted a revised privacy policy. The new statement urges all 17,000 member businesses to implement voluntary safeguards and controls over the personal information each company collects in the course of doing business.

The chamber's new policy statement, the result of a 10-month effort by the group's privacy committee, closely follows recommendations put forward in last year's final report of the Privacy Protection Study Commission. It says the chamber supports voluntary programmes by business as the primary means to assure and protect individual rights in business and professional transactions.

The foundation of "an effective privacy protection policy," the statement reads, rests on three overall objectives. The first is to minimise "intrusiveness" by establishing a proper balance between what a "data subject" is expected to divulge to an organisation and

what that individual can expect in return in terms of privacy protection.

The second is to maximise fairness, through providing open access for data subjects to their personal files in a way that will minimise the amount of incorrect, outdated or unnecessary information maintained by the record-keeping organisation.

The third is to create "legitimate and enforceable expectations of confidentiality" by defining and publishing the recordkeeping organisation's obligations regarding the use and disclosure provisions of personal data that is maintained.

Crop monitor

DESPITE reports that the order had been cancelled (CW, July 19), an ESI040 computer from Robotron of East Germany has been installed at the Iraqi Centre for Agriculture and Agricultural Reform. It is used to monitor soil quality, water supply and fertilisation, and compile statistics for planning livestock farming, crop cultivation and storage.

Lear Siegler Data Products Limited, 207 Finley Road, Camberley, Surrey, United Kingdom. Telephone (0276) 850226

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Monsanto invests \$2.5m in system to monitor employee health

THE giant chemical company Monsanto Corp expects to pour \$2.5 million into a new computer system that will monitor the health of its 50,000 employees.

Monsanto will feed into the computer employee medical histories, employee exposures to specific chemicals, and even data relating to the more than 30,000 materials the corporation makes and uses at its 200 plants across the US.

The new computer system will also store data in a format to fit the reporting requirements of such federal agencies as the Occupational Safety and Health Administration, OSHA, and the Environmental Protection Agency, EPA.

The computer will also allow Monsanto to provide the US Congress and regulatory agencies with much more meaningful data than is now available, the company claims.

By closely monitoring employee exposures to various chemical substances, Monsanto hopes to be able to detect any possible relationship between the exposure to specific chemicals and early signs of disease or health hazards.

"The system will enable us to see very early on if any possible problem areas are beginning to develop so that we could take prompt action to protect the health of our employees," says Don Bishop, director of environmental communications at Monsanto.

Besides protection of employees' health, Monsanto

hopes to realise other benefits from the information system. "The regulatory agencies are going to start requiring even more detailed records than we must presently provide, and obviously a system that will enable us to retrieve this data rapidly and in proper form will save us time and money," Bishop claims.

The Monsanto spokesman adds that a number of organisations in private industry and in the government have already inquired about the company's plans to computerise employee health data. "It's a system that makes sense," he says.

Martex 79 exhibition

COMPUTER users from all over Europe are being invited to attend Martex '79, described as Europe's first exclusive exhibition for the leasing and second user market.

Martex '79 takes place from March 6/8 at the Fairbridge Hotel, East Grinstead, Sussex, which can be reached easily by road or rail from London and by bus from nearby Gatwick Airport.

Exhibitors at Martex '79 will comprise leasing companies and used computer vendors from the UK and the Continent.

Full details of the event can be obtained from the organisers, Walker Ellis Ltd, 54 Dandridge Road, London SW18. Tel: 01-843 1148.



COGARVIEW

Leasing: the great entrepreneurial days are over

THE launch of IBM's new 303X range has been accompanied by a chorus of bullish and, I fear, unwarranted prognostications by the leasing companies — those that survived through the lean mid-seventies, that is.

It is said that drowning men will clutch at any straw. The insistence of the leasing men that the 303X will turn out to be as long-lived as the 360 seems to me to be a case of wantonly wishful thinking. No one would deny them the chance of a second bite at the cherry, but if I turn my eyes to the horizon I see no latter-day Saul Steinberg striding towards the Chemical Bank.

Lessons always were gamblers, despite the wash or respectability provided by the massive profits and overnight empires of the late sixties and early seventies. They gambled essentially on the pundits being wrong when they talked of the "rapid pace of technological innovation" and so forth.

In the particular conditions of 1968-1972 they were right. But to repeat the same coup in the almost opposite environment of 1978-1982 is about as likely as a sighting of Halley's Comet.

In my view the great leasing boom was a product of a rare conjunction of factors, possibly unique to the period and certainly not now to be seen. Foremost were, of course, the advanced design of the 360 and IBM's pricing policy.

In retrospect it is possible to speculate that IBM did not immediately realise to what it had given birth with the 360. They knew, of course, that a new dimension of performance had been achieved, but without a substantial installed base over several years they could only guess at the reliability and longevity of the range.

With System/360 IBM had reached a plateau. They were way ahead of the game, as the range's immediate identification as a new generation recognised. They have never since been so spectacularly innovative. The plateau was mistaken for a minor peak by almost everyone but the leasing men. It was assumed that 360 was the first of a quickening series of developments whereas, if anything, it was the last major development until the emergence of the micro. The leasers bet IBM and everyone else that 360 would have an economic life way beyond even its manufacturer's wildest dreams, and so devised a protectionist pricing policy. That is not a mistake it has made since.

But much else was running in the favour of leasing at that time, too. In the first place it was the end of the — as yet unforeseen — end of a prolonged spending spree. The world economy was awash with investment capital. Computers were selling as fast as new model numbers could be thought up.

Then, too, the leasing com-

panies were filling an unrecognised gap. Traditional sources of finance were cautious of the new technology; they were weary of the speed of obsolescence over the previous decade and unconvinced of the underlying growth rate of the industry.

Four years later, at the end of the nominal life of a 360 by IBM's 1969 calculations the world has been plunged into a depression. Credit was tight, capital virtually non-existent. Users were four years more mature. The gloss had worn off the generation game.

It had become almost a universal view that if a system worked there was no longer so much to be gained by turning it in for something slightly larger or slightly more sophisticated. Salesmen's claims were regarded with scepticism. The leasing companies' belief that a 360's life-span was nearer 10 than four or five years was looking about right.

How many, if any, of the conditions existing in the late sixties or early seventies are apparent today though? Instead of coming to the end of a boom, with a recession just around the corner, we are just coming to the end of a recession; and only an optimist would so far predict that a boom is just around the corner.

There is more capital around than for several years, but nothing like the profligate wealth of the 1960s. The computer industry has become public property. It is fully understood by the banks and finance houses — indeed, it is they who underpin most of today's leasing business.

More fundamentally, though, I do not see the 303X range as another 360. It is a step forward in the state of the art, fair enough; but not such a large one as to inspire a confident prediction that we have reached another plateau. Rather the reverse. The potential of the micro, looming

over the whole industry like Damocles' sword, has created an environment of flux in which firm predictions can be made about the short-term future.

I realise that I am indulging in pontificating about the pace of innovation in a way that proved so misleading years ago, but this time there is plenty of evidence to back up.

All this is not to say, however, that business done over the 360 competing new ranges is the nature of the business has changed. Most leasing goes through the computer that are selling the equipment. The bigger manufacturers have their own leasing companies, operating effective credit lines from their own balance sheets. The leasing companies' role is to use their flexible facilities to accommodate users who are not yet ready to commit themselves to a long-term lease. Leasing money remains available as long as cash is firm and off-rent does not widely over a period.

The banks — usually ahead where floating rates are concerned — have become sophisticated operators in the leasing market. These sorts of leasing opportunities are now. Sometimes the bank is sold to the bank, but the real value remains with the leasing company, with consequent balance sheet problems.

The leasing companies are planning a lot of faith in the 303X range. IBM's predicted rent and base of 303X machines is less optimistic. The character of another new IBM range in early 1980s is a considerable sort of price-cutting on the part of the 303X promoter. A lot of fingers are in the air, getting hurried.

US rise in DP balance of trade

THE US balance of trade for computer and business equipment, including copiers, continued to rise favourably during the second quarter of 1978, according to statistics released by the Department of Commerce.

The industry had a healthy 22.7 per cent positive increase in the balance of trade for the second quarter of 1978 over the corresponding period in 1977. But that is a smaller increase for the second quarter than the

industry enjoyed overall in 1977. Year-end figures for 1977 revealed a 27.1 per cent increase over 1976.

The second quarter of 1978 showed a positive balance of \$878.9 million while the same quarter of 1977 had a positive balance of \$553.5 million.

Although exports rose 31 per cent from \$940.3 million to \$1,232.3 million, imports were up 43 per cent from \$386.9 million to \$553.4 million. The greatest pro-

duct area of increase was data processing equipment, which rose from \$304.5 million to \$422.5 million, or 39 per cent. Imports of data processing machines rose 60.2 per cent from \$145.5 million to \$235.4 million, or 62.5 per cent. Imports of non-data processing equipment rose 45 per cent from \$241.4 million to \$347.9 million, or 44 per cent.

Paris and accounting processing machines were the largest items. They rose 62.5 per cent from \$145.5 million to \$235.4 million.

IBM's plan for the 303X range is to act as a catalyst for the micro, which is expected to be a major project in law and design. IBM's plan for the 303X range is to act as a catalyst for the micro, which is expected to be a major project in law and design.

IBM suspended order-taking in Iran following a dispute with the government about 18 months ago, and has been involved in protracted negotiations to resolve the problem.

"We have a small number of non-Iranians employed there, but in view of the continuing unrest, the majority have been temporarily withdrawn," a spokesman told Computer Weekly.

Stepping into the IBM breach, Iran sold two of its IBM-compatible AS/4s to the Iranian health ministry and the company is continuing active operation in the country. Honeywell has seven Italians and one American who have chosen to carry on working in

NEWS FROM SOUTH AFRICA

US donates cancer recognition system

Edmond Frank reports from Cape Town

A COMPUTER system capable of classifying cervical cancer cells has been donated to the South African Medical Research Council in Cape Town by Professor Peter Bartels, professor of

microbiology and optical sciences at Arizona University.

Professor Bartels, who developed the programs, says the system is used mainly for cell recognition in cervical cancer smears.

The system has so far been installed only at one other centre outside the US.

"Images of the cells," explains Professor Bartels, "are processed by an ordinary light microscope with a scanning device. This converts the amount of light passing through a standard, prepared series of cells into a display of numbers, which are then manipulated by the computer program to give relevant, measurable characteristics of the cells, which are analysed for normality or abnormality."

The process, he says, changes clinical cytology from a question of subjective assessment into a mathematical model which can be reproduced on magnetic tape which can be sent around the world.

"By adding the use of the computer, we are extending our ability as physicians to perceive what is going on in the human body and adding to our ability to produce a correct diagnosis."

Professor Bartels claims that malignant cells can be differentiated with 85 per cent accuracy by putting the readings from the system into a mathematical formula.

The South African Medical

Training of blacks welcomed

A DECISION by the Careers Development Project of the US-South African Leadership Exchange Programme to sponsor the training of black computer programmers has been welcomed by the South African computer industry, which is currently suffering from a chronic lack of trained personnel in all areas.

The training will be undertaken by CIM-Deltak, a company in the Johannesburg-based Fine Spamer group, which specialises in the multimedia training of data processing personnel. Fine Spamer is a member of the worldwide BIS group.

Suitable black people, according to a spokesman for Fine Spamer, will be trained on a specially developed by CIM-Deltak and which makes use of internationally recognised ANSI Cobol programming series.

ICL launches hotels registration and accounting system

AN hotel administration and guest accounting system, HAGAS, has been launched by ICL in South Africa in an attempt to corner a market estimated to be worth more than £11.7 million.

Brian Wachsberger, marketing manager of ICL's professional services division in South Africa, says that about 100 hotels in the country have 150 or more rooms which could justify installation of the system.

This market alone, he believes, could be worth as much as £6 million.

He adds that hotel groups with central reservation facilities could account for additional sales worth more than £5 million.

The system, of which only five have so far been installed in the UK, is an online real time system based on the System 10.

HAGAS provides check-in and registration facilities, reports on expected arrivals, room status and room verification.

Wachsberger says South African hotels are showing increasing interest in computerised systems because of the difficulty in recruiting suitable staff and the dramatic decrease in the price of hardware as well as the fact that ageing electro-mechanical accounting equipment needs replacing.

He believes that HAGAS could increase hotel occupancy by up to 5 per cent.

Exodus of experienced DP staff 'ominous'—survey

EXPERIENCED computer staff are emigrating from South Africa at an "ominous" rate, according to a survey carried out by a staff consultancy, Computer Personnel. Its 1978 salary survey for South Africa shows that 80 systems development staff, or 4% of the total in the country, left over the last year.

Some of these are expatriates returning to the UK, but a good many are South Africans moving permanently to Australia.

A sizeable number of skilled computer staff are coming into South Africa from Rhodesia, but it appears that many are using South Africa simply as a stepping stone on their way to Australia.

South African DP is experiencing rising staff shortages and high turnover, like other countries. Vacancies for analysts have gone up this year to 22.4% from 19.5%, and for programmers to 19.3% from 11.2%.

First 2950 installed

THE first ICL 2950 to be sold in South Africa has been installed at the Cape Town head office of the Southern Life Association, one of the country's largest insurance companies.

Valued at £700,000, the system includes 1.5Mbyte of main store and 100,000 1000-word exchangeable disc storage.



TO enhance the management of its air freight operations, Cargolux Airlines International has ordered a Citi-Honeywell Bull Level 64/50 system, which will join a 64/40 at the company's data processing centre in Luxembourg. Cargolux will also use the two machines to aid maintenance of its fleet, which comprises two Canadair CL44s five DC8 Super 63s, and in the near future, a Boeing 747.

Once fully operational the systems will allow Cargolux's satellites around the world to link up and exchange data, and transactional application programs will use the IDS II database management system and Transaction Driven System software.

Our picture shows the signing of the contract for the second Level 64.

US study boosts East-West trade

THE Brookings Institution, a private commentator on government affairs, located close to the White House, has recommended that efforts to trade with the Soviet bloc and China in high technology items be increased.

The study covers East-West trade in general, but specifically analyses trade in computers and other technology products.

While there have been responsible arguments that the

East gains more from this trade than the West, Brookings believes that no one can determine with certainty whether trade damages Western dominance in economic or political matters. Brookings instead believes that trade in itself provides clear benefits to all parties.

Acknowledging that trade in computers appears to provide a multiplier in economic gain (through increased productivity and better management) for the

East, and pointing out that computers may be critical to certain defence objectives, such as anti-ballistic missile systems, Brookings nevertheless believes that the potential risk associated with East-West trade in data processing equipment and knowledge is not great.

The planned economies, according to the study, do not generally gain as much from the use of individual computers as free enterprise nations.

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Distributed processing goes into Orbit at last

IN his seminar on database design in London in December, 1976, James Martin, then a fellow of the IBM Systems Research Institute, predicted that "the current trends towards distributed processing will dominate the industry within two years".

No trend can be said to "dominate the industry" unless IBM participates in it. Dr Martin's prediction was thus generally understood to be a veiled warning to all the DP managers with IBM systems that IBM would shortly drop its Canute-like attempts to help them stem the tide of proliferating minis in their organisations, and would announce some powerful locally programmable distributed processing systems of its own.

Both sides of IBM have now done so within James Martin's timescale.

Early in 1978, the General Systems Division announced the availability of SNA compatible SDLC protocols on its Series 1, System 34 and 5110 computers from mid-1979 onwards. Now

the Systems Products Division in its turn has announced the locally programmable 8100 as successor to the earlier 3790 communications system, which depended on its host 370 or 3030 for all its local programs.

Yet IBM would deny that it is a recent convert to distributed processing. It would claim that it has promoted distributed processing among its users for over ten years, first with the hardwired 2741 teleprinter and 2260, 2265 and 3270 series displays, and more recently with the intelligent 3600 Finance, 3650 PoS and 3790 general purpose Communications Systems and the Systems Network Architecture announced four years ago.

It all depends, of course, how one defines "distributed processing", that most ambiguous of data processing buzzwords.

End users of data processing services are primarily interested in distributed access to processing power and computer-held files via online data entry and data collection terminals in the offices and workshops where source data originate, inquiry

terminals on the desks of managers and other staff, and remote printing terminals in the locations where computer output is analysed.

Such devices and online connections have indeed been offered by IBM and most other mainframe manufacturers for over ten years. What has changed during the intervening period is the location of the processors to which these distributed terminals are connected.

The earliest networks connected these distributed terminals directly to a single centralised DP mainframe, that was also responsible for all batch processing. It is a network structure still widely used in the US, where competition among common carriers has kept the cost of leased lines down and their reliability high. But it has never been widely adopted in Europe, except for purely local networks within a single office, university campus or factory domain.

Long distance communications lines provided by the

WITH the announcement of the IBM 8100 system, previously code-named Project Orbit, last month, IBM's Systems Products Division has at last followed its rival General Systems Division in announcing a powerful locally programmable distributed processing system with large file storage, that can be integrated within an SNA network.

The first 1979 deliveries of the new 8100 system will coincide with the opening of new circuit and/or packet switched public data networks in most

European countries, which will probably be followed by a substantial raising of the charges for private leased lines.

In this Marketview, Fred Lamond assesses the probable impact of both these developments on the processing patterns of large IBM users, notably those who like to remain within the IBM mainstream. He examines also the extent to which they strengthen, or weaken, the case for adopting IBM's Systems Network Architecture. Lamond is European Editor of the Auerbach Computer Technology Reports.

monopoly European PTTs on the other hand, have been both too expensive and insufficiently reliable to make the work of remote offices and factories dependent on dumb terminals connected to them. Some local processor intelligence at each factory or office site on which there are online terminals has been the European norm, especially among the European banks that have pioneered data communications networks in Europe.

The continuing drop in the price of minicomputers and microcomputers during the last

ten years has led to a proliferation of these systems on both sides of the Atlantic, both among small businesses and among large corporations and institutions. Among the latter, they have been mainly used, however, to implement new free-standing self-contained applications, rather than for the decentralisation of the older invoicing, stock control, payroll and similar applications from the centralised batch processing systems.

Examples include the ICL 2903 and other business minis used by some UK banks for foreign exchange accounting, dividend calculation and distribution, while customers' current accounting remains centralised on two or more large mainframes at a single or at the most three sites in the whole country.

This pattern of distribution of processing power is more properly called dispersed processing. The term distributed processing on the other hand, is increasingly reserved to systems in which the different processing stages of a common task are divided between a central mainframe and local data entry or order entry transaction processing minicomputers in each sales office or factory.

As orders are received by mail or over the telephone at local sales offices, they are entered on the keyboards of local data entry terminals. A local processor controlling these terminals performs data entry validation in real time, and may even consult local files in real time to check that the items in the order are in stock, or that the customer placing the order has a valid account and is up to date with his payments. Similar online data entry procedures take place at factories as manufactured products are completed, and at warehouses as new stocks are delivered.

Once local orders, stock deliveries and production data have thus been entered on local systems and validated, they are transmitted to the main central system for updating the main

files, and performing subsidiary processing of by-product data. The outputs of such centralised processing will then again be transmitted to the local processing systems of the sites where the outputs are required, and these local minicomputers will do the required formatting and printing.

The crucial factor in all such distributed processing systems is the speed of interaction required between the local data entry and the central file processing system. If all the stocks, accounts and other files that have to be interrogated in real

Steer clear of SNA for long distance datacom links

of their long analogue dialling times.

The European PTTs have spent substantial capital sums on these new digital data networks, on which they will earn a return only if they are intensively used by data communications users. In order to encourage such use, the PTTs are widely expected to raise the rental charges on leased telephone and telex lines, although the French and British Post Offices at least have disclaimed any intention of making these charges usage dependent, at least as far as single user private networks are concerned.

At the recent ISL conference, the Post Office Data Communications — the Way Ahead, a PO Telecommunications HQ spokesman predicted 10 to 70 per cent higher rental charges for leased telephone circuits in Britain as soon as the current price freeze on Post Office charges is lifted.

In this changed data communications environment, it will become increasingly advantageous for large companies to

and the Four Phase System IV, its terminals can also interrogate and update interactively the files of a host 370 or 3030, whether running under DPCX in 3790 compatible mode, or under the native DPPX operating system.

In its control of locally connected terminals, the IBM 8100's DPPX mirrors SNA's hierarchical polling star network architecture. But contrary to first impressions, this does not strengthen the case for general adoption of SNA for IBM users' primary long distance data communications network between 8100 local sites and the host 370 or 3030.

Unlike its predecessor, the 3790 Communications System, the new 8100 Information System can communicate with its host 370 or 3030 not only in SDLC, but also in interactive 3270 BSC or in Model 25 RJE. Multilevel BSC, Conversion to SNA and SDLC is not therefore the required entrance ticket to the use of the IBM 8100's very attractive distributed processing facilities.

Conversion to SNA would, however, make the use of the public packet switching digital data network very expensive for British, French and Benelux users, because the charges on these are distance independent but volume sensitive, with a fixed charge for each transmitted packet. If the user employs a hierarchical polling architecture like SNA on his packet switched links, he will be charged for every polling packet from the host and every NAK from the satellite 8100, instead of just for actual information packets.

This volume sensitive charging problem does not face the users of private leased line networks who need to keep these anyway for their voice communications. Such users may, however, want to keep the option open of using the IBM 3790 private automatic branch exchange (PABX) at their main and/or other office sites to concentrate and switch both voice and data communications traffic on common long distance lines. The IBM 8100 Information System can be interfaced to a 3790 PABX but only in BSC and not in SDLC mode.

Finally, US owned multinationals may wish to keep the option open of using the SBS satellite or some other satellite link for their US-Europe data communications when such satellite links become available. Such satellite links are subject to propagation delays of 0.5 to 1 second in each direction. This makes SDLC an unsuitable protocol on such links for any transmission speeds higher than 4800 bps full-duplex, because SDLC's three-bit packet sequence number field does not allow more than seven packets to be transmitted in one direction before an acknowledgement for the first packet is received on the reverse channel, which may take up to two seconds.

IBM users interested in the new pattern of distributed interactive processing made possible by the IBM 8100 Information System and public digital data networks should therefore steer clear of SNA for their long distance data communications links, and use SDLC only on their local 8100 controlled sub-networks.

In this changed data communications environment, it will become increasingly advantageous for large companies to distribute their interactive database files to the sites where they are interrogated in real time.

distribute their interactive database files to the sites where they are interrogated in real time, and to retain at the main DP centre only those portions of interactive database files that are interrogated and updated in real time from any of a number of geographically dispersed sites.

Such distributed interactive processing requires sophisticated software on the local distributed processing satellite systems. This was pioneered over three years ago by Four Phase Systems Inc. on its multi-workstation System IV, which it now sells also in the UK and which is marketed on the Continent and in Scandinavia by Philips Data Systems under the label P7000. Each System IV workstation can interrogate and update in real time any file record held either on the System IV processor's own disc backing files, or on the files of a host IBM 370 at the same or a remote site.

At least eight other business minicomputer, intelligent terminal and data entry system manufacturers active on the European market have followed the Four Phase Systems' lead in the last 18 months (see Table). Now both IBM's General Systems Division and its Systems Products Division have done so as well.

With backing disc storage expandable from 23M to 320M bytes, the new IBM 8100 Information System is clearly designed to hold not only data entry and validation files, but also interactive local databases. But like its predecessor, the IBM 3790 Communications System,

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The coming year will see a radical change in the European data communications environment. New public packet switching digital data networks will be opened successively in France (Transpac), Belgium, Netherlands and the UK (PSS), while the four Nordic capitals will be linked by the first links in the new circuit switched Nordic Public Data Network.

time during data entry can be held on the local processing system, there is no problem. Locally entered data can then be transmitted overnight in batch mode to the central DP system by whichever transmission method is cheapest.

On diskettes or magnetic tape reels transported by company van or Datapost, or

Via an online data communications link, using either the company's own private voice communications network out of office hours, or the Post Office's Midnight Line Facility on the switched public telephone network.

In either case, the cost of overnight batch data communications is limited to the amortisation or rental cost of the modem (£200 per year on the Midnight Line Facility) with no volume charge for the data messages or the connection time. The simple IBM 2780, 3780 or HASP BSC communications protocol is quite adequate for such temporary switched point-to-point circuit connections.

Complications arise only if one or more of the files that have to be interrogated in real time during the data entry process, or at any other time, have to remain centralised. This is the case, for instance, of stock files on high value infrequently ordered items for which stocks are held in a single warehouse serving widely dispersed sales offices throughout the country. As each order originating from anywhere updates the file by diminishing the number of items remaining available for subsequent orders, the file cannot be duplicated among the local processing systems, but must be interrogated in real time over a long distance data communications link during peak hours.

European data communications users outside France and West Germany have hitherto been able to choose only between the switched public telephone and telex networks on the one hand, private leased telephone and telex lines on the other, for their data communications links. Temporary

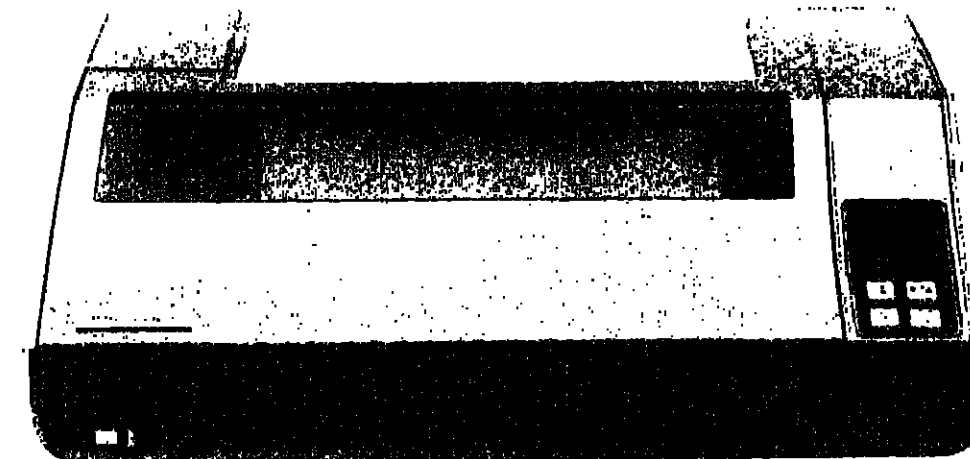
Manufacturer	Model	Memory capacities (bytes)				Type of disc	Maximum number of terminals	Local programming languages				
		Main		Disc				Cobol	RPG II	Basic	Fortran	Other
		Min	Max	Min	Max							
IBM (SPD)	8100 3790	256 K 8 K	512 K 192 K	23 M 10 M	320 M 30 M	Fixed Fixed	100 + 40	Y —	— —	— —	Y —	Ass Param
IBM (GSD)	System 38 System 34	512 K 32 K	1.5 M 128 K	64 M 8 M	640 M 128 M	Fixed Fixed	40 8-64	— Y	RPG III Y	— —	— Y	— —
Digital Equipment	TRAX DS 350	192 K 32 K	3.8 M 256 K	56 M 5 M	1,408 M 112 M	Exch Exch	100 + 4	Y —	Y —	Y —	Y —	Dibol Dibol
Four Phase Philips	System IV P 7000	24 K	384 K	50 M	270 M	Exch	32	Y	—	—	—	Data IV
Raytheon-Cossor	PTS 1200	48 K	128 K	10 M	320 M	Exch	24	—	—	—	—	Macro1
ICL	System Ten 220	20 K	160 K	8 M	160 M	Exch	20	—	Y	—	—	Package
Redifon	R 650	128 K	128 K	66 M	264 M	Exch	24	—	—	—	—	Package
Nixdorf	620/45	64 K	64 K	33 M	66 M	Exch	16	—	—	—	—	Package
Datsaaba	D16/30	32K	128K	10M	120M	Exch	32	Y	—	—	—	Package
Inforex	S 7000	64 K	128 K	10 M	40 M	Exch	7	Y	Y	—	—	—
Incoterm	SPD 20/40	32 K	64 K	10 M	40 M	Exch	32	—	—	Y	—	—

Table 1. Distributed processing satellite systems with IBM 3270-compatible host file interrogation facilities

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As the year comes to a close "electronic mail" bids fair to become the buzzword of 1978 in the US computer-communications industry. MORRIS EDWARDS reports on the state of the art, and its likely development.

Battle is joined over electronic mail

ELECTRONIC mail is going to be a major battleground in the clash between AT&T and IBM, and possibly its affiliate, Satellite Business Systems. However, this time other major manufacturers such as Xerox, Burroughs and Exxon are likely to join the fray, along with that old warrior, the US Postal Service.

There's little doubt that electronic mail systems will mushroom in the years ahead, but what is less clear is what form the system should take, since there are currently two main approaches typically include facsimile, communicating word processors and computer-based message systems.

Facsimile is the foremost approach, primarily because of its similarity to mail. However, facsimile machines have traditionally been expensive to lease and use, and their usefulness stunted by lack of compatibility.

That situation is changing with the development of faster

and less expensive units that meet internationally adopted standards, and with the availability of transmission services geared to facsimile users and capable of resolving equipment incompatibilities.

At the faster end of the scale, Rapicom is the leader in sub-minute machines (capable of sending a standard page in under one minute). Until the beginning of 1978, Rapicom had virtually no competition other than the 3M Co, which had announced a sub-minute machine, the Express 9800, but had not shipped a large number of units.

Since then other firms have entered the sub-minute market, most notably the Visual Sciences/Matsushita venture, Panafax, whose machines are presently the most powerful of any.

In terms of less-expensive models, the undisputed leader is Qvip, whose parent, Exxon, has financed three other successful

electronic mail ventures: Qume, Vydec and Qyx.

There are rumours that another Exxon venture, Optical Information Systems, is developing a holographic storage capability which, if integrated with facsimile and word processing systems, could revolutionise electronic mail applications almost overnight.

On the question of compatibility, Study Group XIV of CCITT, the international standards body for communications, has announced preliminary standards for three facsimile machine types: ones that take from four to six minutes to transmit a page; ones that transmit at three minutes per page; and sub-minute machines. Besides resolving the compatibility problems, these standards also pave the way for "networking" which in turn strongly promote electronic mail applications.

Rapicom provides this network

working capability with its System 50, which permits a master station to poll up to 50 slave machines to retrieve or send messages from or to them.

However, the company which has made the biggest strides to date is the Burroughs subsidiary, Graphic Sciences Inc, which recently introduced two CCITT-compatible machines — one slow-speed and one sub-minute — and a network capability that links its low, medium and high-speed units for automatic operation.

Since users can put together an automated network of units operating at different speeds, they can better match their hardware to traffic flow — a facility which gives Graphic Sciences a decided edge for electronic mail applications.

Meanwhile, yesterday's facsimile leader, Xerox, continues to languish, though it is believed that major announcements will be coming soon on a sub-minute

machine and one operating at 2-3 minutes per page.

While the word processors are starting to be used for electronic mail applications, for the most part they are still too expensive, and few currently have communications options (less than 10 per cent), partly because many applications are intra-facility and so require no communications, and partly because of organisational structures and attitudes.

Here again, though, the organisational barriers are coming down, and vendors are starting to upgrade the communications features on their latest models.

Compatibility requirements transcend communications protocols, since the machines must also transmit format information and other special codes.

With its magnetic card/Selective typewriter combination, IBM initially settled on the 2741's ASCII-based protocol for transmission at 135 bps. Now, with its Office System 6 units, the standard is the 2770-compatible, Ebcidic-based bisync protocol, with operation at up to 2400 bps.

Intelligent word processors solve the compatibility problem by allowing the user to select the

apparently decided to concentrate its resources on high-priority service, so Teletype appears to be in limbo for the moment.

However, another timesharing firm, Scientific Timesharing Corp, is trying to follow in the footsteps of Tymnet, whose evolution as a value-added carrier stemmed from the network activities of timesharing parent, Tymshare Inc.

Next year, ITT Domestic Transmission System plans to enter the packet-switching fray with its Fax-Pak service, which will perform the necessary conversions in modulation, protocol, code and speed to allow incompatible machines to communicate with each other. Also, the network will allow users to send messages from a character-oriented terminal to any other subscriber's facsimile unit or terminal.

Another service planned for 1979, but liable to be delayed at least two years, is AT&T's Advanced Communications Service (ACS).

Electronic mail also figures prominently in the plans of Satellite Business Systems

Computer Sciences examined in govt scandal probe

THE scandal-ridden US General Services Administration has added one more problem to its already long list. A recent GSA audit report states that the federal agency overpaid Computer Sciences Corp for computer services it provided the government during 1975.

The federal auditors have recommended that GSA determine the exact amount of the overpayment and take action to recover it from CSC.

The report also urges GSA to study the amount paid to CSC for computer services from 1973 to 1977. During that time, CSC had a sole-source contract with



Carr... disputed contract amounts for other years to be probed.

the government to provide services through its Infontet network.

The audit also examined allegations of impropriety in the acquisition of consulting services subcontracted out by CSC.

A total of \$948,000 was paid CSC in 1975 for subcontracted services.

"In our opinion, serious questions exist as to the propriety of about \$948,000 which appears to have been billed to the government for consultant and related services by CSC during 1975," the report stated.

"Further," it says, "it is our view that... the government incurred overcharges for consultant and analyst services acquired under the contract."

The report specifically questioned the propriety of \$303,000 of the \$948,000 that was paid to CSC directly for hourly consultant

ants. In many cases, the report says, the consultants "did not meet the minimum requirements of the position level at which the consultant or analyst was being paid."

In one case, the reporter points out, a person billed as a senior consultant with 15 years' experience was being paid \$45 per hour when he had in fact had only seven-and-a-half years' experience and should have been paid only \$18 per hour.

Frank Carr, commissioner of GSA's Automated Data and Telecommunications Service said the agency would follow up on the specific charges for 1975

and, as soon as more manpower is available, would probe the disputed contract amounts for the other years.

He said that if overpayments were made, GSA would recover the money by withholding from CSC's current contracts.

William R. Hoover, president of the El Segundo, California-based CSC, said his company "has always maintained high ethical standards in providing its professional services to clients, and will continue to do so."

He added, "We are confident these standards have not been compromised in our dealings with the GSA."

WASHINGTON REPORT BY CAMERON DAVIS



Changing lifestyles

CONGRESSMAN James H. Scheuer wants to know how the injection of the computer into America's educational mainstream will change lifestyles over the next few decades. To find out, the New York Democrat has introduced legislation in Congress that would establish a national commission to study the use of computers in education.

The new commission would have to carry out a number of in-depth research projects covering the next 20 years, such

as a forecast of changes in information technology, with emphasis on the effect on education and lifestyle; a forecast of the need for individuals with computer skills; and a forecast of the effect of increased use of computers in education on school financing and local taxation.

It will also look at research in the application of cognitive psychology and artificial intelligence to computer-based learning.

Adapso hits out at OECD data flow guidelines

OVER the border means out of control. That is the fear prompting and outbreak of national data protection laws restricting the flow of information across borders. But the US Association of Data Processing Service Organisations, Adapso, says the US does not sit back and accept the status quo as an "irreversible indication of the future."

In testimony before the US State Department's Public Advisory Subcommittee on International Data Flow, Adapso representatives blasted the revised transborder data flow guidelines proposed by the US delegation to the Organisation for Economic Co-operation and Development.

In their present form, Adapso complained, the TDF guidelines from the US meekly accepted "the inevitability of further unco-ordinated and disparate legislative efforts in Europe."

Philip C. Onstad, chairman of Adapso's International Data Communications Committee, told the State Department group that it was time the US got out of the back seat and into the driver's seat.

"The US could assume a position of leadership, he said, by proposing the development of a uniform or model approach to TDF among the OECD's 29 member countries."

"In Europe today, a myriad of licensing, registration, notification and inspection require-

ments face the operator of a multinational data communication network," Onstad said. "The cost and difficulty of complying with an increasingly diverse array of national legislation may soon impair or eliminate the economic incentives to operate or establish these multinational networks. If this happened, the consuming public would suffer — through increased costs and lower quality goods, services, health care and education."

Onstad, a CDC executive, outlined the benefits that could accrue from a uniform approach to TDF legislation: uniform procedures would promote statutory compliance, without the deterrent of cumbersome, costly and conflicting statutory requirements, multinational networks would continue to expand; a uniform approach could still allow for local variations to suit the legal systems, mores and cultures of individual nations, and all individuals would share the same rights with respect to protected personal data.

"If successful," Onstad said, "this approach would encourage the enactment of legislation in each country which uniformly stipulates specific required and prohibited actions. This approach would satisfy the need to provide a fast, efficient and inexpensive mechanism for deterring violations of an individual's privacy and redressing specific grievances."

'Stay loose till more is known of ACS'

"ACS is to the data terminal what Long Lines is to the phone — universality and ubiquity," says Harry Newton, president of the Telecom Group in New York.

Speaking at a seminar on AT&T's proposed Advanced Communications Service, sponsored by the Yankee Group in Cambridge, Massachusetts, Newton offered some advice to corporate users on how to make datacomm decisions.

According to Newton, the user should follow four pointers: "Stay Loose" until more is known about ACS' capabilities and pricing; make sure your network has an X28 interface; make sure your link protocol is HDLC (X25 based); and think twice about computers and terminals to which ACS will not interface.

Speaking at the same seminar, Dr Dixon Doll, president of the DMW Group in Ann Arbor, Michigan, said, "Everything ACS wants to do is like motherhood, and is generally needed by the end user." Still, he cautioned users to consider several "caveats" such as: Don't count on ACS tomorrow and do not think that ACS intrinsically

provides all necessary services for true computer networking. Converting existing synchronous nets to ACS is no trivial task, he pointed out, and asked how ACS will interface with IBM SNA networks.

Speaking at the ACS seminar for Westinghouse Electric Corp, Ralph Krichbaum said, "We want ACS to be successful, we expect ACS to be successful."

Krichbaum, manager of network planning in Westinghouse's Telecommunications Department, says one of the benefits of ACS is that it will set standards "so that we can say to vendors, 'If you can't communicate through ACS, you can't sell to Westinghouse.'" He says his company is also banking on ACS to provide SNA "without the IBM shackles."

Krichbaum claims that many hardware vendors are "behind the eight-ball" with IBM's SNA and SDLC protocols.

"With Bell's system, those vendors would have a fixed target," Krichbaum says. Because AT&T is taking on the task of interfacing with IBM software, other vendors could develop new capabilities with the assurance that ACS would tackle the interfacing problems.

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appropriate emulation mode via keyboard-entered commands or cassette- or diskette-loaded program. However, this facility comes at a price.

An alternative, and perhaps less expensive, approach is to use ordinary typewriters with Optical Character Readers (OCRs) to capture the text electronically.

Perhaps the most powerful electronic mail approach is the computer-based message system.

AT&T, Digital Equipment Corp and Hewlett-Packard all utilise computer-based message systems, while on the commercial front, Citibank has done the most pioneering work.

Of all electronic mail developments, perhaps the most encouraging signs of life come from the suppliers of transmission services. Already, Southern Pacific Communications offers a specialised service for facsimile users, while Tymnet provides a store-and-forward message service utilising its packet network.

Satellite Business Systems talks about high-speed document distribution as a major element of its planned service offering, and AT&T's proposed Advanced Communications Service is replete with features geared specifically for electronic mail applications.

Furthermore, ITT is waiting in the wings with a packet-switching service for electronic mail, and others such as Boeing and General Electric are poised for entry.

SPC's Speedfax service transmits a facsimile message to any of 30 cities around the country for a flat fee of 25 cents/minute, dropping to 18 cents/minute overnight.

Tymnet's store-and-forward message service, called OnTyme, allows communications between dissimilar terminals with speeds from 300 to 1,200 bps. Tymnet also supplies a turnkey system if required.

Some months ago, Tymnet's competitor, Telnet Corp, was making noises about an electronic mail service called TeleMail. In the meantime, the value-added carrier has

whose future was recently cast doubt by the action of the District Court of Appeals in Washington, requiring the Federal Communications Commission to review its approval of the satellite carrier.

SBS proposes two configurations of a Batch Document Electronic Distribution System (BDS): BDS-I would be a "communicating copier-like distribution system," while BDS-II would be an "offline, local compressed document storage system with high-speed mailroom-to-mailroom transmission of batched data streams."

BDS-I requires the sending and receiving devices to operate synchronously, whereas BDS-II provides for store-and-forward operation using a magnetic tape unit for storing documents in digital data form. Each tape unit is able to store up to 600 pages.

With these systems, mail would be collected the way it is today, and would be entered by mailroom personnel into the high-volume transmission system; the documents would be printed directly (BDS-II) or some later time (BDS-I) at recipients' mailrooms.

Recently, the electronic mail market has attracted another major entry, the US Postal Service. It is planning a system called ECOM (Electronic Computer Originated Mail) for delivery by large users on computers.

ECOM will accept input via data communications, a computer or computer tape and a central switching system will route data to one of 25 offices called Serving Post Offices located nationwide. There, the messages will be printed, developed and delivered in the normal way.

ECOM's announcement raises several issues. Does it make the Postal Service a common carrier, subject to regulation by the FCC? Isn't the Postal Service acting as a computer service bureau by printing all those letters instead of letting the originator do it? Is ECOM the tip of a communications iceberg, with the Postal Service later expanding its role to include the mail role to include the

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INTERNATIONAL NEWS IN BRIEF

Itel widens horizons

EMPHASISING the growing business potential of the Third World, Itel Corp has sold its first IBM-compatible mainframe in Iran and is setting up a joint venture in Mexico. The machine for Iran, an AS/5 machine approximately equivalent to a 3031, is to be installed with the Persian Health Ministry. In Mexico, Itel has found a group of local investors to put up 51% of the capital for a new marketing company there. In Sweden, the first AS/6 system has been installed by the country's biggest department store group, NK-Ahlens.

Univac for Lot

THE Polish airline, Lot, is the second East European airline to order a Univac computer for reservations. It will use the Univac Standard Airline System software. The other airline, Aeroflot, bought Air France's Alpha software. The \$3.95 million system is scheduled for installation in July, 1980.

Great Dane?

A WATCH DOG body for data processing has been set up in Denmark by a group of private citizens. Called the Danish Data Council, its stated aims are "to work for a democratisation of EDP, against the increasing registration of personal data, and against abuse of EDP".

Singapore order

A \$55,000 order for Petic D3000 disc drives has been received from Total Computer Systems in Singapore.

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COMPUTER WEEKLY INTERNATIONAL

Use of laser in communications grows

THE use of lasers in fibre optic communications systems should grow at 50 per cent a year from 1980 to 1985, from \$12.5 million to \$56 million, according to a report from Business Communications Co in the US. Another report* from BCC predicts that the fibre optic systems market will grow from \$28 million in 1978 to \$1.2 billion in 1987.

The laser market is broken down into eight sectors, of which communications is the smallest and fibre optic laser communications only a part of that, along with atmospheric laser communications. They

will have a combined growth of 35% between 1980 and 1985, followed by the information processing market, which includes point-of-sale scanners, printing and computer applications, and is predicted to grow at 30% in the same period.

The laser market as a whole is completely dominated by the military sector, which at \$410 million in 1980 is over 30 times the size of the communications sector. It will continue to be the largest sector, but is expected to grow at about half the rate, which is still healthy enough at 18 per cent.

The markets for fibre optic equipment outlined in the second report are telecommunications, cable television, computers, process control and instrumentation, particularly medical. The equipment breaks down into cable, transmitters, receivers and connectors, and the report predicts mergers of companies making the different parts as the market demands complete systems.

The Expanding Laser Industry, report GB-058, price \$750; Fibre Optics: Trends, Dynamics, report G-004, price \$1650, from Business Communications Co, Inc, 100 N. 10th St, 20700, 8 Windward Road, Stamford, Connecticut 06906, USA.

Fibre optic links for cable TV

A SWITCHED cable television system designed in the UK by Rediffusion and operated in Arnhem, Holland, by Delta Kabel is claimed to be the first in the world to use fibre optic links to carry a signal into a subscriber's home.

The system, called Dial-A-Program, at present offers television and stereo radio programmes, and Delta Kabel hopes to demonstrate a new service direct from Reuters in December or January if permission can be obtained from the Dutch PTT. The medium is also suitable for acting as a common carrier for high speed interactive information services, but Rediffusion says that providers of such services cannot charge for them unless the European governments allow pay TV, as the US and Canadian governments do.

At present the Dial-A-Program service operated by Delta Kabel under licence from Rediffusion has only one trunk link, one demonstration display and one subscriber link of optical fibre in addition to 200 coaxial cable links from one switching centre and 200 twisted pair links from another, but they came into service in the first

week in June, beating a similar Japanese system, called Higashi Ikoma Optical Visual Information System, by five weeks. The Canadian system announced recently (CW, August 24) is planned to come into operation early next year.

The subscriber to the Dial-A-Program service uses a 12-key pad like a telephone push-button dialler to select the channel to be switched down his line from the exchange. Low speed signals from the keypad travel down the copper-clad steel reinforcing members in the fibre optic cable, and could be used with a simple interactive information system such as basic videodata. More complex interaction could be catered for by providing a full alphanumeric keyboard if a suitable service was offered.

Dial-A-Program is a wideband switched service with a capacity of 12 television channels of which five are currently filled. Capacity can be expanded 12 channels at a time: a copper cable based system for South African Broadcasting Company built in Johannesburg in 1972 has 72 channels connected to 600 outlets.

The carrying capacity of the optical fibres used is similar to the copper links in the rest of the system, and no advantage is gained from using them at the moment. But the companies want to gain experience in the use of fibre optic technology in this type of system in preparation for the mid-1980s when copper prices are expected to pass fibre prices and keep rising.

Hardware for Hardwar

THE first three Univac 1100 orders in India, exclusively revealed earlier this year (CW, April 27) have now been formally announced. As reported, Air India, currently a user of the British Airways IBM reservation service, is to get an 1100/12 and will run the Univac USAS airline reservation package.

The other customer is Bharat Heavy Electrical Ltd, BHEL, which last month took delivery of an 1100/11 in Hardwar, Uttar Pradesh state, and will install a second in Delhi next month. Worth over \$4.6 million all told, the orders were placed by Operations Research Group of Baroda, Univac's Indian agent.

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ICL France boosts turnover

TURNOVER for ICL France the year ending September 30, 1978, is estimated to have been 2,355 million francs, 64% compared with 223 million francs last year. ICL France currently employs 900 people.

The worldwide figures for 1978 will not be announced until the end of the year, but are expected to be just over £500 million. The French weekly OI Industrie, managing director Dr. Wilson revealed that during the year, ICL shipped 120,296, 35,295.

He also revealed that the company is currently carrying out four 2950s and one 2980 computer, and one 2972, every two weeks.

On the European computer industry, he was quoted as saying: "Let me be arrogant. We are the most successful European computer company not only in France, but in the world."

He also revealed that the company is currently carrying out four 2950s and one 2980 computer, and one 2972, every two weeks.

On the European computer industry, he was quoted as saying: "Let me be arrogant. We are the most successful European computer company not only in France, but in the world."

Phoenix at Ford

THE shambles in our picture represents the aftermath of a huge fire, which destroyed car manufacturer Ford Europe's parts warehouse at Cologne-Merkenich, West Germany. The fire also caused extensive damage to the company's IBM 370/145 computer system.

Needless to say, however, the fire did not stop the DP department being inundated with requests for action. The accounting and insurance departments wanted information to help with the insurance claim. The supply and distribution departments had to produce plans for a substitute warehouse, as well as to plan the ordering, acceptance, stocking and distribution of parts. Various other departments added to the load by asking for report summaries.

Under these trying circumstances, the informatics Mark IV software system purchased by the Parts Operation the previous month proved a great asset; indeed, the company estimates that the investment paid for itself in just three weeks.

The gain came from the time saved in developing and running the new programs required. The DP department managed to do this in just half a week, a third of the time it would have taken using Cobol. Furthermore, they did it on a different machine, a 370/158, using a different operating system, OS instead of DOS. They were able to make this change without altering the Mark IV software at all, it being necessary only to convert the JCL.

Stories written on to VDUs

OVERSEAS correspondents the UPI wire service will be able to write their stories on to VDUs, and send them in complete editing on screen, instead of typing and passing them to a punch tape operator for transmission.

An £80,000 order placed by ATS Communications of Harrogate Heath, covers 30 VDU terminals, compatible with receive and edit visual terminals to be installed in Europe, the Middle East and South Africa over the next months.

Network aids research

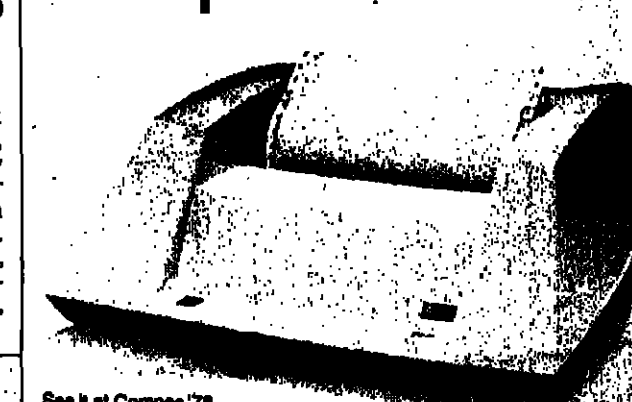
RESEARCH into magneto-hydrodynamic electricity generation at Montana Energy Research and Development Institute in the US will be aided by a five-computer distributed network to be supplied by General Automation at a cost of over \$1 million.

The system will process over 2,000 analogue and digital input and output links to components of the magneto-hydrodynamic equipment which generates electricity from fuel oil or coal in a way that may offer a 50% increase in efficiency over conventional steam and nuclear systems, and reduce pollution and water consumption as well.

The network will consist of five 128K byte GA-16/440

minicomputers with floating point arithmetic units. Four of them will run tests and communicate the results over high speed HDLC links to the fifth, which will have six interactive graphics terminals attached, as well as a printer, a plotter, a card reader, two 80M byte drives and two high density magnetic tape units.

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If you cannot accept this invitation please telephone to
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Ivor Norton Management Services Ltd
Recruitment Consulting Division

P.O. Box 63, Copthall Tower House, Harrogate HG1 1TS. Tel: Harrogate 66628.

DATA PROCESSING MANAGER

Silentsight Holdings Limited having recently installed a new ICL 2903 need someone to manage, develop and improve the efficiency of the computer service within our expanding group of companies.

We are looking for someone ideally aged 25-35 with at least 3-5 years computer experience. He or she is probably a project leader now. Experience is desirable in Cobol, Systems Analysis and Design, and a knowledge of O and M Analysis.

Above all, we are looking for someone with an ability to lead and develop a small, enthusiastic team to extend our computer service. We offer a salary commensurate with your ability, and the usual benefits including assistance with removal expenses associated with a company of our standing.

Please apply for an application form to:
John Roberts, Personnel Department,
Silentsight Holdings Limited,
Wellhouse Road, Barnoldswick,
Cottingham, Lancs.
Telephone: 0282 815888

A MEMBER OF THE SILENTSIGHT GROUP OF COMPANIES

The Knight Contractors stand out from the crowd.

They get a mind-sharpening challenge with every new contract, every new test of their skill. They know the true market value of their experience, and we make sure they always earn it. They can plan their contracts to build experience that can fulfill their highest ambitions. And they know that, wherever they are and whatever they are doing, the strength of Knight Computer Services is right behind them:

This week's contracts -
your escape from the crowd.



Programmers/Analysts

Immediate/Forthcoming Assignments

UK
IBM COBOL OS - SURREY
IBM COBOL - CITY
IBM RPGII + SYS 3/32 - MIDDLESEX
IBM DOS SYS PROG - LONDON
ICL COBOL + GII - LONDON
ICL COBOL + GII - EAST LONDON
ICL 2903 COBOL - MIDDLESEX
VENTEK DATASHARE - MIDDLESEX
BURROUGHS COBOL - SURREY
HONEYWELL COBOL - CITY

OVERSEAS
IBM OS SYS PROG - ITALY/GERMANY
HONEYWELL 66 COBOL - HOLLAND
CDC ASSEMBLER - HOLLAND
MAINFRAME/MINI FORTRAN - HOLLAND
ASSEMBLER + CORAL 66 - BRUSSELS

Minimum 2 years FORTRAN + REALTIME
Contract to 12 months - BRUSSELS

3 years experience of COBOL. Practical exp.
ICL 2980/10/60. Knowledge IBM COBOL.
Also IDMS FORTRAN APL PL/1 vacancies -
LUXEMBOURG

Please contact Richard Kaluzynski or Suzy Gilling: 01-491 4706 or 01-439 3411.

Operators

European Languages a distinct advantage

UK CONTRACTS

IBM 370/168/158
OS VSI/2
ICL 2960, 70, 80
VME/K DME
ICL System 4/70/2 & 50
J & MULTI System
HONEYWELL 66/60
GCOS

IBM
IBM Data 100
IBM System 3 & 32
IBM 370/DOS VS (POWER
GRASP & CICS)
JCL Writers OS & DOS
ICL
ICL 2903/4 Ops.

ICL 1900 GII Ops. & Data
Controllers
ICL 1900 GII & GII + Ops.
OTHERS
Burroughs, Small & Medium
Systems
Honeywell Level 60
Terminal & Small Systems.
Various Contracts

For further details or advice on these or other U.K. and European Contracts, call Sue Smyth, June Mogg or Jane Asbury, NOW! on 01-491 4706 or 01-439 3411.

All vacancies are open to both male and female applicants.



Knight Computer Services Limited,
14 Old Park Lane, London W1Y 4NL
Staff Services Division of BOG Datasolve Group and
a member of Computing Services Association.

01-491 4706

01-491 4706

JBA**Engineer Programmers**

North Surrey £4,500 - £8,000
This company, a subsidiary of an extremely large engineering consultancy group, specialises in producing individually tailored industrial systems, usually based on either PDP11/minis or INTEL micros. All successful candidates can have a career leading to Chief Engineer and above - your capabilities and drive will be well rewarded.
Applicants should have at least 1 years mini or micro systems experience with a good knowledge of a low level language. If you also have an Engineering or Electronic degree and/or experience of hardware design, this could prove extremely useful.
A career with this company will ensure total involvement in the latest techniques and applications of this type of processing. Contact: Andy Wright

Junior Consultants

Berks/USA/Europe Start c. £7,000 + BUPA
Opportunities have arisen in the European Systems team of this major American company for Analysts or Analyst/Programmers to join as Project Consultants. They will provide support and advice on commercial projects of all kinds to installations throughout the UK and Europe, and applicants should therefore have a good grounding in commercial applications, preferably with a strong IBM bias.
These vacancies have occurred through internal promotions to more senior levels indicating that career prospects are definitely good for able candidates. An ideal opportunity to gain experience of Project Management at Consultancy level. Travel to the USA and Europe, supported by generous tax-free allowances, will play a major part of the job. Contact: Andy Wright

COBOL Programmers

London & Home Counties up to £8,000
A large international organisation has a number of opportunities for programmers at both junior and senior levels, to work on commercial development projects.
Candidates should have a minimum of eighteen months experience of COBOL on either IBM or ICL mainframes. Senior programmers should be able to demonstrate a substantial background in commercial applications. Other languages, such as PL/I, RPG2 or PLAN would be considered. Training will be available where appropriate.
Excellent salaries, fringe benefits and career prospects. Contact: Jim Baker

For further information on any of the above vacancies please contact the appropriate consultant.
If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES, International Personnel Consultants
16 Maddox Street, London W.1. Tel: 01-491 4478

MICRO Consultants

North of London (rural) £5,000 - £7,000
Degree level exponents of the micro processor technology (with or without experience in industry) are invited to consider this growing company of specialist systems designers who are well established in their field.
Previous experience or an interest in word processing systems and a thorough proven ability of writing ASSEMBLER are required. Necessary ingredients of the consultant status will be self motivation, an innovative nature and a business-like approach with clients at all levels.
Attractive salary package and achievement bonus scheme is offered to employees. Contact: Mike Creamer

Software Specialists - Commissioning

Berks/Australia c. £8,000
A well established British engineering organisation, leaders in the field of specialised computer-controlled systems, requires two software technicians to commission a large installation in Australia during 1979.
The successful applicants would be involved in the system building and testing in Berkshire and then spend about six months next year, in Queensland, leading the commissioning teams.
Candidates should have three years experience of industrial or process control systems with the emphasis on software. Ability to manage a small team and liaise with customer management essential.
Permanent UK salaries negotiable according to experience. Relocation assistance to Berkshire where appropriate. Very generous allowances whilst in Australia. Contact: Jim Baker

Field and Support Engineers

All areas c. £5,500 + car
Several of our clients, mainly mini-computer suppliers or manufacturers, seek good experienced field and/or support Engineers. Generally, the work involves dealing with a variety of problems associated with Hardware and diagnostic software. In some cases training will be provided during the early stages.
Candidates must be able to demonstrate a sound systems approach to their work and be capable of dealing with people at all levels.
The positions offer excellent remuneration packages, career prospects, and work involvement. Applicants are invited to call and discuss their requirements and aspirations. Contact: Margaret Stevens

TERMINAL SYSTEMS SALES

Finance and Government Markets
Nationwide Coverage—London Based.

SALES EXECUTIVES

Package: Up to £12,000
(Base £7K + and car)

ACCOUNT MANAGERS

Package: c£14,000
(Base £7K-£10K and Car)

- A well-established Company under new management.
- Division of a total systems supplier.
- Growth situation with real promotion prospects.
- Competitive, State of the Art product range.
- Realistic targets.

Call TONY BAKER NOW, 01-499 4501.

Ref. RW 45/2

MANAGER

Compiler Development

★ Salary by Negotiation ★

A major, multi-national mini and mainframe manufacturer wishes to appoint a Manager to set up, lead and develop a compiler development group here in Britain. The emphasis will be on block-structured languages and the post will suit a mature professional with sound practical experience in the compiler world.

The man or woman appointed will have considerable authority to influence the Company's software product development plan and must, therefore, be an individual of stature and drive.

Certainly he/she must have the technical capability necessary to command the respect of those he/she appoints to the department, but the personal attributes are of paramount importance.

The emoluments package will reflect the seniority and importance of the job, and will include a negotiable salary.

Enquiries please to A. P. BAKER, 01-499 4501.

Ref. RW 45/1

SOFTWARE DEVELOPMENT IN THE WEST COUNTRY**SOFTWARE ENGINEERS**

to £7,500
+ Relocation

Product and Career developments into the 1980s

My clients are a successful British Electronics Group, who in recent years have broadened their initial product base to encompass microprocessor technology and sophisticated data communications techniques. To keep up with the demand and development of their products they are seeking software engineers to work in one or more of the following areas:

- ★ Enhancements to system and user software pertaining to sophisticated data entry products.
- ★ To develop batch and realtime communications networks for distributed key processing.
- ★ To investigate and instigate development of a new product range in the light of such innovations as micro processors.

If not accustomed to a mini environment, candidates must be able to demonstrate an appreciation of the constraints of such hardware. Specific technical background requirements depend largely on your assigned projects, but activities span from specification and software design through to formal release as standard company products.

This is your opportunity to put your stamp on today's and tomorrow's technology. Seize this chance by calling me:

GEOFF MARSH on 01-499 4501

Ref. RW 45/3

PROJECT MANAGERS/LEADERS

Based NW London

c£7,000 Plus Car Allowance

My client is a leading supplier of distributed processing equipment, who is enjoying a high growth rate. As a result, the company wishes to appoint a couple of Project Managers or Project Leaders, whose task will be the management and implementation of total customer systems, from inception to completion.

The openings therefore represent excellent opportunities for senior programmers or analyst/programmers, with a minimum of 3 years' commercial experience, to advance their careers and broaden their experience with state-of-the-art products.

The company offers competitive conditions of employment, in a modern office situated in a convenient part of North-West London, giving easy access to all parts of London and the Home Counties to the North, West and East.

In addition to a car allowance, the income package includes both a performance bonus and a productivity bonus.

Interested candidates should contact TONY BAKER by telephone (01-499 4501) or by letter, at the address below, quoting

Ref. RW 45/4

hutchinson-scoggins recruitment
47/48 New Bond Street (entrance in Maddox Street) London W1Y 0HE Telephone 01-499 4501

QUEEN MARY COLLEGE
University of London
Faculty of Engineering
COMPUTER ASSISTED TEACHING UNIT
GRADUATE RESEARCH ASSISTANT

Required to develop and implement computer-based teaching materials.
Applicants should have an interest in innovation in teaching method.
A degree in engineering, science or mathematics is desirable and experience in computer programming an asset.
The appointment, which may be suitable for a new or recent graduate, will be for 2 years, initially.
Salary scale (under review) £3,984-£4,892 p.a. plus £450 London Allowance.
Further details and application forms obtainable from Dr P. R. Smith, C.A.T.U. (CW), Queen Mary College, Mile End Road, London, E1 4NS, to be returned by 24 November.

UNIVERSITY OF CAMBRIDGE
Department of Engineering
Multi-User Minicomputer

Applications are invited for the post of supervisor to take day-to-day responsibility for the multi-user minicomputer which is being installed by the Science Research Council as part of a nationwide network. Applicants should have a degree in Computer Science or equivalent post-graduate experience.
Pensionable salary range £4,133-£5,604 (depending on age and experience).
Term 1 January, 1979 to 31 December 1982.

Further information and application forms may be obtained from the Secretary, Faculty of Engineering, Trumpington Street, Cambridge CB2 1PZ, to whom applications should be sent not later than 30 November, 1978.

Programming a computer is one thing.

Programming people is another.

Date training—in the past 8 years has become one of the largest and most successful computer training companies in the UK. The high standard of our courses has attracted companies in all spheres—corporations, government departments, local authorities and computer bureaux.

The number of students attending computer courses is continually increasing. Which is why we need programmers to join our lecturing staff now.

We are looking for men and women who have a minimum of 2 years experience in programming. You will be mature with the ability to talk to people, to communicate your skill and experience—clearly and succinctly.

After an initial training period your work will be split between delivering courses, compiling reports, visiting student installations and ensuring the training courses are as developed, comprehensive and practical as possible.

You will enjoy an excellent salary between £5,500 to £8,000, with an annual bonus and monthly commission based on profits. Above all you will enjoy the challenge and reward which is part of an instructor's life and the satisfaction which can be derived from a successful class of students.

If you think you are ready to start programming people rather than computers we are ready for you.
Ring up to 230 pm any evening for an interview or drop in Saturday 10h or 10h in the morning.

Hugh McLachlan,
Data Training Ltd.
Assets House,
17 Elverson Street, London SW1
Telephone: 01-828 2282.

Data Training Ltd

RPG11 — up to £6,000
in Baker Street, W.1

Training given in online techniques and system design to programmers with key entry ability. Friendly office with free food and flexible hours in entertainment and shopping areas.

Ring: 01-487 4413

SYSTEMS ANALYST
required for Birmingham, experienced in micro computers and business systems. Good salary, company car, house, etc.
SALESMAN & PROGRAMMER
also needed for the post, all areas, friendly atmosphere, excellent career prospects, friendly colleagues.
EVINGTON STAFF AGENCY, 4 Market Place, Leicester. Tel: Leicester 802221

ADVANCED SYSTEMS**London (West End)**

If you're looking for a chance to work on sophisticated systems, including major database and transaction processing systems, this is an opportunity you should investigate.

We are recruiting for clients, a London (Mayfair) installation with considerable development work on hand. Working conditions are good (new building, sea restaurant), and training in modern techniques will be provided. There are specific hardware, software or applications constraints, we are simply looking for sound analysts and programmers who want to learn and progress. Career openings are for:

SYSTEMS ANALYSTS, £6000-£7000

You will probably have had from one to three years' analysis experience and the ability to communicate well at all levels. You should be capable of leading a team from time to time. Your background could be on any hardware or applications. Due to growth, prospects are good.

SOFTWARE PROGRAMMER

Up to £6200

Have you worked in a software or systems programming role, ANY LANGUAGE? This is an opportunity to join a small software team implementing database systems, enhancing the operating system, developing utilities, etc. Training in IDMS and VME/B will be given.

APPLICATIONS PROGRAMMERS

Up to £5600

Looking for a chance to upgrade your experience? Want to learn database and real-time techniques, and to work to good professional standards? If you have two years or more sound programming experience (ANY LANGUAGE), you could be an excellent career opening for you. COBOL is used, and you will be retrained in this language if you are not yet familiar with it.

Please ring us for a confidential, informal talk. If it is easier for you to speak outside office hours, leave a message on our answering machine and we'll call you at home.



EDP SYSTEMS
52-53 Margaret St. London W1N 7FF

FORTRAN PROGRAMMERS

West End £4500 to £6500+
The data processing division of a long established civil engineering giant is seeking young and capable programmers to work on their growing range of projects. Applications vary from Management Information packages to Financial and Technical modelling on the one hand, and from Engineering Consultancy to Bureau services on the other. Due to the diverse nature of their applications a background on any mainframe or mini will be suitable, with a minimum of 12 months' FORTRAN. Opportunities to progress into Systems Analysis or new technical areas are available, and there is the added bonus of occasional overseas travel as well.
Reference HK 45/1

PDP11 PROGRAMMERS

London & Home Counties to £7500
If you have at least one year's experience of programming on PDP11's we have many vacancies which will be of interest.
Your experience should include programming in either BASIC, MACRO ASSEMBLER or FORTRAN under RSTS, RSX-11, MUMPS etc. The companies range from in-house users of all sizes to large Software Houses, whilst applications include Engineering, Graphics, Operations Research, Technical Support, Financial Systems, plus Telecommunications & Military Systems. Salaries & prospects are excellent for all the positions and benefits vary from season-ticket loans & L/V's to company cars & subsidised mortgages. For more information please ring at once.
Reference HK 45/2

OPERATIONS

Junior and Senior Operators with experience on IBM, UNIVAC, Honeywell, Burroughs, NCR, ICL, DEC and PDP are required urgently. Listed below are a selection of our vacancies: — If you don't see one to suit you, call us to find out about the many others we currently have available.

IBM	OS	OPS SPT	3 YRS	£5500
IBM	OS	SHIFT LDR	4 YRS	£5300
IBM	OS	SNR. OPS	2 YRS	£4700
IBM	OS	OPERATOR	1 YR+	£4300
IBM	DOS	SHIFT LDR	3 YRS	£4700
IBM	DOS	SNR. OP	2 YRS	£4800
IBM	DOS	OPS SPT	3 YRS	£4500
IBM	DOS	OPERATOR	1 YR	£4300
ICL	MAN	OPERATOR	1 YR+	£4000
ICL	GII	SNR. OP	2 YRS	£4500
ICL	GII	OPERATOR	1 YR	£4000
ICL	GIII	OPERATOR	1 YR	£4000
HONEYWELL	OS2000	OPERATOR	1 YR+	£4000
NCR	B2	SNR. OP	2 YRS+	£4500
NCR	B1, B2	OPERATOR	1½ YRS	£4000
BURROUGHS	MCP	OPERATOR	2½ YRS	£5000
UNIVAC	90/30	OPERATOR	2 YRS	£4500
UNIVAC	1108	OPERATOR	1½ YRS	£4800
DEC	PDP	OPERATOR	2 YRS	£4200
DEC	PDP	SNR. OP	2 YRS+	£4500

DATA CONTROLLERS

We have many positions, both Junior & Senior, at salaries up to £6000

COBOL PROGRAMMERS

City £5500 + Mortgage
A major financial organisation based in the city wishes to recruit a number of capable programmers to join their rapidly expanding DP department. The company is interested in programmers with a minimum of one years experience preferably on ICL equipment.
The hardware in use is the ICL 1900 range running under GEORGE II but plans are well advanced for an upgrade to the 2900 series so any experience gained on 2900 models would be advantageous. A competitive salary is coupled with an attractive benefits package which includes LV's, 4 weeks vacation and a subsidised mortgage.
Reference JC 45/3

RPG II PROGRAMMERS

London (All Areas) £4000 to £6500+
We have a varied selection of vacancies in all areas of London covering a wide range of programming experience.
These positions cover a broad spectrum of the Computer Industry, ranging from large well established software consultancies and manufacturing companies to small retailing and publishing concerns.
The equipment in use includes all the IBM SYSTEM 3 series and ICL 1900 and 2900 mainframes.
All the companies offer attractive starting salaries, and fringe benefits vary from Free Lunches and Season Ticket Loans to Travelling Expenses and Annual Bonuses.
Reference JC 45/4

ENTREPRENEUR

LONDON £15-£20,000

POTENTIAL FOR DIRECTORSHIP OF INTERNATIONAL SOFTWARE HOUSE

The TASK is to build up a UK software business.

The NEED is for a dynamic d.p. professional capable of

- ★ personally creating sales successes during his initial period.
- ★ subsequently managing the growth of the company.

The BACKING comes from a well-established international software house that enjoys a fine reputation in the USA and continental Europe.

If you have a sales track record, sound technical ability, the potential for senior management and real ambition.

Call DAVID J. HUTCHINSON on 01-499 4501

Ref. RW45/5

HARDWARE ENGINEERS

£4,000-£7,000

Plus Company Car

★ Based Home Counties ★

My client is a well-established manufacturer of peripheral and terminal equipment, who is enjoying an unprecedented rate of growth, which will place it high in the international ratings by the early eighties.

To service the expansion of their customer base, they now plan to strengthen their field engineering force with professional engineers, who wish to improve their career prospects without loss of security.

In addition, they require Applications Engineers to provide detailed engineering support to the sales force in customer negotiations.

Age and education are not of prime importance, nor is it necessary that your experience should have been gained on any particular equipment types. Professional competence is of paramount importance, in order to match the Company's own high standards.

You will be offered an attractive salary to reflect your level of experience and the very competitive benefits package will include a company car.

Phone TONY BAKER on 01-499 4501 or write to him at the address below quoting

Ref. RW 45/6

Datascene Recruitment Ltd
Sceptre House
169-173 Regent Street
London W1R 7FB

datascene

01-439 787
24 hour answer phone

UNIVERSITY OF STRATHCLYDE
Applications are invited for TWO posts

COMPUTER PROGRAMMER

In the MANAGEMENT SYSTEMS DIVISION of the UNIVERSITY ADMINISTRATION.
The post will involve programming in COBOL for both new systems and the maintenance of existing systems. The University Administration operates a Honeywell 6800, 256K tape drive system which provides both batch and interactive processing services throughout the University. The appointments will be particularly suited to candidates with 2-3 years' programming experience and preferably with graduate or other qualifications in Computer Science.
Salary scale on Grade LA of the national salary structure for senior Administrative Staff. Salary scale £3285-5555 with increment according to qualifications and experience. Superannuation benefits.
Application forms and further particulars (quoting 58/78) and enclosing a self-addressed envelope (8 x 4") may be obtained from the Human Resources Appointment Office, University of Strathclyde, Royal College Building, 204 George Street, Glasgow G1 1QU, with whom applications should be lodged by 21st November, 1978.

CLASSIFIEDS

CICS Analyst Programmer, OS or DOS with either COBOL or Assembler experience. Casual London based, salary dependent on experience to £2,250. Flexible options background preferred, but not essential.

OS/VS Analyst Programmer for 8-10 months. Both based London. Rate from £250 p.w. PDP 11 background an advantage. Salary to £1,500 per week. Must be available to start by early January 1979. Strict personal career review but transfer contract.

AUSTRALIAN: Applications and Systems Programmer for major positions in Sydney, Melbourne and Perth. IBM, Honeywell, ICL, DEC and GE experience preferred.

Superannuation — where applicable Intel 8088. 25% 10% required by multi-national franchise seller. Locality interest UK. Company can offer excellent career path. Salary to £110. Interviews at new London office.

ANALYST — T.P. and S.S. Applications and Systems Programmer. Prior IBM software. Full facilities expenses and vast range of real company benefits with reference to £110. Interviews at new London office.

MATRIX

Telephone: 01-499 4636 (10 lines)
300 Oxford St. London W1M 5NA.

OPERATORS

ALL INSTALLATIONS IN LONDON AND HOME COUNTIES

IBM OS	SFT SUPVR	£5200	3 SHIFTS
IBM OS	OPS ANAL	£4800	DAYS
IBM OS	SNR OP	£4800	3 SHIFTS
IBM OS	OPERATOR	£4200	3 SHIFTS
IBM DOS	SHIFT LDR	£6300	3 SHIFTS
IBM DOS	SNR OPS	£5500	3 SHIFTS
IBM DOS	OPERATOR	£4000	3 SHIFTS
IBM DOS	JNR OPS	£3700	3 SHIFTS
ICL GII	SHIFT LDR	£5500	3 SHIFTS
ICL GII	OPERATORS	£4400	3 SHIFTS
ICL GII	OPERATOR	£4300	2 SHIFTS
ICL GII	OPERATOR	£4300+	3 SHIFTS
ICL ANY	OPS/SHIFT LDERS	£4000+	3 SHIFTS
UNIVAC ANY	OPERATORS	£3800	2 SHIFTS
UNIVAC ANY	OPERATORS	£4600+	3 SHIFTS
DEC PDP	OPERATORS	£4200	3 SHIFTS
NCR ANY	OPERATORS	£4200+	2/3 SHIFTS

DATA CONTROLLERS — WE HAVE MANY VACANCIES IN ALL AREAS. £3000-£5000

FOR MORE DETAILS PLEASE CALL TODAY

TARGA COMPUTER DIVISION

**3 LIVERPOOL STREET
LONDON EC2M 7NH**

01-283 2751

FULL TIME TUTORS REQUIRED

International training organisation, due to expansion within the tutorial department are seeking three additional tutors to teach T.O.P.S. and privately sponsored students in computer operating and programming. We envisage a minimum age of twenty-five years and at least two years in computer programming or operations and preferably with a teaching background.
Salary negotiable.
Telephone Mike Grosse on 01-388 0891 or write in the strictest confidence to:
COMPUCENTRES LIMITED
North Wing, Drayton House
Gordon Street, London W.C.7

**EDUCATION DEPARTMENT
RICHMOND UPON THAMES
COLLEGE**

**Part-time (Day)
Lecturer in
Computer Studies**

Required immediately for up to 17 hours per week. Please telephone Mr. R. Steady, 01-892 8959, ext. 145. Richmond upon Thames College, Egerton Road, Twickenham TW2 7SL.
London Borough of Richmond upon Thames

**AMERICAN EXPRESS
INTERNATIONAL BANKING GROUP****SYSTEMS DEVELOPMENT GROUP
MINI-COMPUTER
PROGRAMMERS**

The U.K. Banking Group's Computer Systems Development Programme now recruits mini-computer programmers to work on sophisticated real-time TP Systems. The Group is based at our Mortgage Offices using High Level Languages on Honeywell Level 6 Mini-Computers.

Previous experience on this machine is not necessary as training will be provided. We seek candidates who are of Senior programmer potential who would like to start small but expanding team.

Salary level: Circa £8,000. Plus all the fringe benefits normally associated with a senior international Bank.

Please apply in writing stating age and experience to:

A. J. Reynolds
Deputy Personnel Manager, UK Region
American Express I.B.C.
c/o 120 Moorgate, London EC2P 2JY

Zimmer
GREAT BRITAIN

SYSTEMS ANALYST/PROGRAMMER

This position offers an opportunity to join a dynamic and exciting Data Processing Department.
The successful candidate will be aged between 25 and 45, will report to the Data Processing Manager and should have experience in computer systems, a knowledge of R.S.T.S. is essential.
The position involves basic + programming working on a Digital PDP 11/40 computer.
Conditions of employment are good, and include contributory pension scheme, staff productivity bonus, sick pay scheme and 25 days holiday per annum.
Apply in writing with full C.V. to:
Group Personnel Manager
Zimmer Orthopaedic Ltd.
Industrial Estate, Bridgend, Mid Glam. CF37 5RY

CONTRACTS**Interactive Software - Wiltshire**

Immediate start — Top rates. Minimum 3 months

Design and develop a micro-based message switching system. System suite will include: Controller, I/O and VDU Driver routines and Preparation/Edit subsets.

GERMANY — Several vacancies for OS-COBOL-JCL in various locations throughout Germany.

CITY & BUCKS — PDP II, RSTSE.

HAMPSHIRE — Stock Control — OS Cobol — Filetab TASK. Immediate start — 16 weeks.

Call BRIAN DAWSON on 01-629 4616 or leave a message on 01-499 4501.

RW 45/7

SALESMEN

**Do you want a career
with a Company —**

— that offers you the opportunity to sell mini-computer systems that meet the needs of today's commercial user and are in widespread use throughout the UK and the world?

— that involves you in the burgeoning market for systems providing dispersed intelligence?

— that supports you with a generous level of systems back-up?

— whose management will inspire your confidence?

— that provides you with an attractive performance-related income package and a company car?

If you do want all these things, and you are a successful salesman already, or have aspirations to move into sales, you should contact me — TONY BAKER — on 01-499-4501 NOW.

Ref. RW 45/8

hutchinson-scoggins recruitment
47/48 New Bond Street (entrance in Maddox Street) London W1Y 0HE Telephone 01-499 4501

01-499 4501

Portsmouth Polytechnic Computing Centre

Applications Programmer

— Post 777

We have recently installed an ICL 2960 and an ICL 2904 to provide a computing service to the whole Polytechnic. Applications programming projects cover not only scientific and technical work but also the design and implementation of computer systems for the administration and library. The Computing Centre seeks to recruit a programmer of graduate or equivalent qualifications, and some previous experience, who wishes to increase his/her experience by working on modern computers. There is a wide range of projects now being started including graphics software, implementation of the IDMS database, and software to support minicomputers linked to the 2960.

Salary Scale: AP2/4 up to a maximum of £1,632 including supplement

Senior Computer Operator

— Post 774

The Polytechnic service is based on a large ICL 2960 supplemented by ICL 2904 and a professional operator is required to join a small operations group currently working on two shifts. Candidates must have a good understanding of VME/B or an equivalent operating system, and at least three years' operating experience together with an 'A' level standard of education. Salary up to a maximum of £5,149 including shift allowance, overtime and supplement.

Applications are available from the Staff Office, Portsmouth Polytechnic, Alexandra House, Museum Road, Portsmouth, or by telephoning Portsmouth 27881 extension 317.

HYDRO-ELECTRIC

SYSTEMS PROGRAMMERS

£4,660-£7,146

The North of Scotland Hydro-Electric Board will install in their Computer Centre in Aberdeen Dual ICL 2960 computers in mid-1979 to replace their well established System 4 equipment.

An extensive terminal network will be supported and comprehensive software including database will be used.

Experienced Systems Programmers are required to develop this software and those with a knowledge of VMEB, MAC, TP or IDMS would be particularly welcome.

Salaries will be in the ranges £4,660-£6,030 and £5,482-£7,146 including Productivity Bonus (Electricity Industry PAG3 and PAG4 scales) and generous assistance with removal costs will be given if required.

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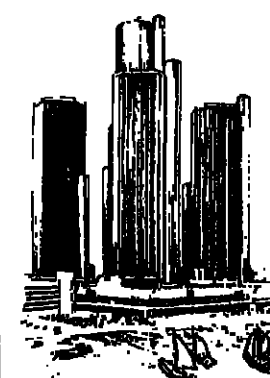
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April 1979

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The Big Match, yet another old film**

Sunday afternoons can be very dreary, and indeed wasteful. You know how it is. You finish your Sunday lunch and fall into a chair. Well this Sunday, November 12th, instead of watching the Big Match or a repeat of an old film, make a positive career move. Ring IDEC.

The reason why we're manning our phones on a Sunday is because we genuinely believe that the offer we are making to talented Real Time and DP PL/1 Programmers, at every level of experience, is second to none. The exposure we give you at the sharp end of 'State of the Art' Software Development will be invaluable to your career; the rewards are high and job satisfaction considerable.

IDEC is the design and development centre of ITT Business Systems and Communications Group, based on the London/Herts border and Sidcup in Kent. We are responsible for the major software development activities of the new products marketed by this worldwide organisation.

For the best professionals, dedicated to advanced software development, we offer opportunities in: REAL TIME, SOFTWARE ENGINEERING, MICRO PROCESSORS, DISTRIBUTED PROCESSING, COMPILERS, DATA COMMUNICATIONS.



We're looking for people with potential at any level — Good Programmers with one year's experience, high flyers in their early twenties right up to the seasoned software veteran at the top of the ladder. In whatever position you join us you'll be surprised how much we value your expertise and how well we reward it. Some of our Software experts are on salaries of £10,000 p.a. or more!

So instead of settling down to watch the telly, put your Sunday afternoon to good use by ringing us on Potters Bar 51199 between 9.30am and 5.00pm. Or call us any weekday and ask for Sue Cameron. IDEC, Canada Life House, High Street, Potters Bar, Herts.

**or a phone
call to IDEC.**

IDEC
A Development Centre of
ITT Business Systems

OPERATORS

IBM 370/138—JUNIOR & SENIOR OPS £4100-£4700 inc
One year's experience for the Junior position, 18 months for the Senior. W. London based, involved in the leisure industry, running under DOS/VS CICS. Three shift system. Good prospects, excellent perks. Ref 581.

NCR C300 OPS—ANY HARDWARE EXP £4400 inc
Wentley based Co. is looking for somebody ideally with NCR experience coupled to B3/B4 knowledge, but is willing to train anybody with any large mainframe background. Prospects are limitless. Ref 290.

GDC 174 6500—SENIOR OPS £4700 neg
Once again, any mainframe experience over the last two years will suffice. Kensington based in an academic environment. Three shift system over a five day week. Good perks and prospects. Ref 580.

INTERVIEWER/OPERATORS £7000-£10000
Outstanding opportunities exist for Recruitment Consultants with a DP background. It's a fast moving business offering limitless potential to the right people.

PROGRAMMERS ETC.

OPS MANAGER £7700 inc
The S.E. London Institution is looking for a fault finder/fixer with proven management ability coupled to an electronics background. Benefits offered reflect the seniority of the position. Ref 584.

DATA SECURITY OFFICER £6000
Based on the Surrey/London border, this ICL installation needs somebody in their late 20s with any mainframe experience, coupled with some software knowledge gained over three years. Days only, excellent perks. Ref 583.

PROGRAMMER £7000 neg
Two/three years' experience using COBOL with a thorough knowledge of CICS is required by this Herts installation. Hardware used is an IBM 370/115, under DOS/POWER. Outstanding career prospects, excellent perks. Ref 483.

STAFFSCENE 24 hrs answering service
COMPUTER RECRUITMENT DIVISION 01-353 6931
8 ST. BRIDE ST., LUDGATE CIRCUS, LONDON EC4

CAREER OPPORTUNITIES IN OPERATIONS

OPERATOR OR CONTROL OFFICER
up to £4418

Professionals offer a valuable opportunity to develop your career in computing.

- Experience with the latest UNIVAC 1100 mainframe equipment
- Operating with an expanding communications network
- Good training and career development opportunities

OTHER BENEFITS

Wide range of relocation allowances, restaurant, free car parking, two shift system with no regular weekend working (salary bonus is inclusive of shift allowance). Staff club, bar, disco, squash, tennis, etc.

THE FUTURE

We've started a comprehensive expansion programme in hardware, systems, staff and accommodation — why not expand with us?

If you're interested — phone or write (with details about yourself) to — Peter Brown, Computer Services Division, County Hall, Kingston upon Thames. Tel: 01-546 1080 ext. 3679.

SURREY COMPUTER SERVICES
COUNTY COUNCIL

**WORCS - GLOS - WILTS -
DORSET
AVON - SOMERSET - DEVON**
To £8k +

A wide range of vacancies exists from Programmer to Systems Designer in the above counties (25+ alone in Dorset). The equipment in use is also varied. It includes ICL 1900 and 2900 series, IBM 370, DG NOVA, PDP-11, Honeywell and Vairan. The languages vary from COBOL to ASSEMBLER to PL-1 to Basic. In short there just isn't enough room to tell you about them all. Should you already live or wish to relocate to an expanding part of the world, then urgently phone (0272) 428631.

At last a bigger pond!

**For computer professionals in
technical support**

Our newly-structured UK Marketing Division continues to contribute to the ICL Group's rapid and profitable growth, following a turnover increase of 45% in 1977.

So we now need to make a sizeable increase in our staff supporting the wide spectrum of our users, with an emphasis on the public sector. We have openings for a whole variety of technical skills, and a thorough product training will be given as required.

Bigger Company

ICL is already Europe's leading computer manufacturer. Its technological innovations have gained worldwide recognition, particularly the 2900 Series and more recently the Distributed Array Processor. The Group's market base covers 86 countries around the globe.

Brighter Opportunities

If you are one of the dedicated professionals we seek, you will work closely with our existing and prospective customers to optimise the application of our computer systems. Vacancies exist in:

Project Management

£6,000-£10,000
Experienced Managers, male or female, with proven ability, who will take responsibility for seeing through significant projects.

2900 Implementation

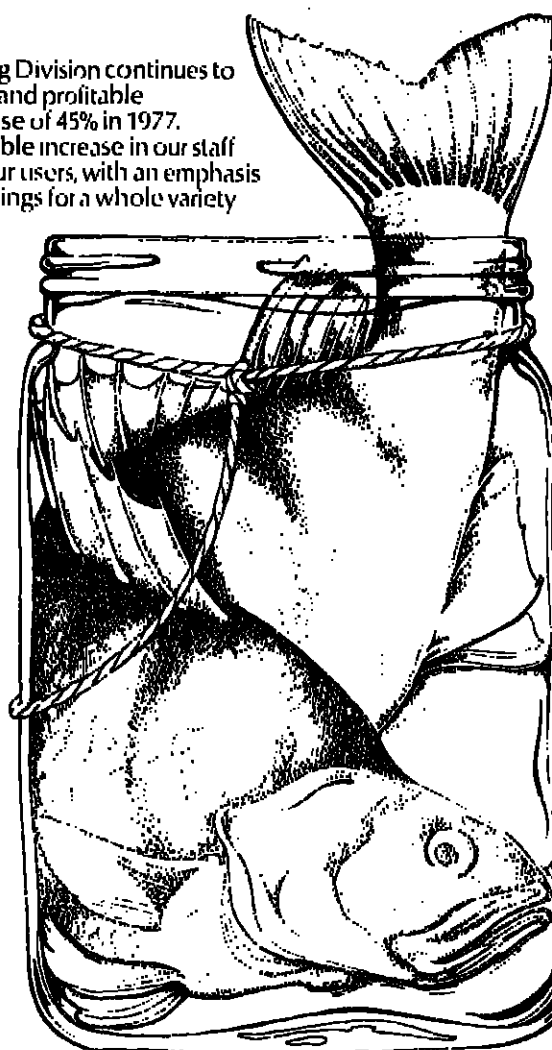
£4,000-£8,000
Technical specialists who can ensure the smooth implementation of sophisticated hardware and software.

General Support

£4,000-£7,500
Technicians involved in pre- and post-sales activities to ensure customer satisfaction across a wide range of ICL products.

Consultancy

£5,000-£9,000
Specialists in software or applications systems (eg TP, database) who can provide particular expertise to all levels of customer management and technical staff.



Our appointments range from North-East Scotland to the South Coast, both at ICL offices and on customer installations. We have substantial requirements in and around the following locations, where interviews will be arranged: London, Birmingham, Manchester, Edinburgh. Relocation assistance is available where appropriate.

Broader Variety

Our equipment spans the entire range of customers' requirements from the small 1500 Series through System Ten, 2903, 4, System 4 and the 1900 range to the largest 2900 machines and DAP.

You will be working in an exciting, constantly developing environment with the intellectual stimulation of being alongside some of the best people in the industry. We are particularly looking for specialists in:

Operating Systems
Telecommunications
Languages and Compilers
Data Management
Transition Operations

Better Training

If you have the right technical ability plus an outward-going personality, this is more important than proven skills on our equipment. We have a number of training centres, with an excellent reputation for both technical and management training. The largest, at Windsor, has a training staff of 150.

International Computers

think computers — think ICL



FIELD SERVICE ENGINEERS

NEW CAREER START £5,500
(Plus overtime + standby allow. + car + training)

One of the World's leading Micro/Mini Computer manufacturers are about to establish a new branch office — this could be your chance to get ahead with prestige products with worldwide acclaim — they offer a generous starting salary + car + bonus and other benefits. If you are a bright Young Service/ Customer Engineer with good academic background/ electronics experience and living in London or Home Counties, then take a big stride forward to an exciting new career with excellent future prospects by calling today — but hurry! Ref: EK 2056 (Consultants).

AD EXECUTIVE (KINGSTON) LTD. 01-546 9473

COMPUTER PERSONNEL APPOINTMENTS LTD.
Career Specialists and Consultants for
**D.P. MANAGERS, SYSTEMS ANALYSTS,
PROGRAMMERS AND OPERATORS**

Midlands, Northern Counties and Scotland
For registration forms apply to:
66 New Street, Birmingham B2 4JU. 021-643 0881
or Tel. 01-328 7251

UNIVERSITY OF WARWICK

2 RESEARCH STAFF Distributed Computing Research Project

Further substantial support for the Project has been announced by the Science Research Council for the design and construction of an integrated hardware/software system for distributed computing. Current work centres around an experimental programming language intended to be usable on systems with different architectures. Two research staff are required, one or possibly both at postdoctoral level, to work on the language design, software and hardware aspects of the project. The posts are for four years, from October, 1978, awarded under the SRC Special Grants Procedure. Applications will be either on the lower part of the Range 1A scale, £3,883-£5,555 p.a. or the Range 1B scale, £3,384-£4,882 p.a.

Application forms from the Academic Registrar, University of Warwick, Coventry, CV4 7AL, quoting Ref. No. 14/A/78. Further details may be obtained from Dr. C. Whitby-Strevens (phone Coventry 24011, extn. 2382) or Mr. D. May (extn. 2387) in the Department of Computer Science.

Open to 1.5.80

PL/1

COMMERCIAL PL/1 PROGRAMMERS, ANALYST/PROGRAMMERS & DESIGNERS 370/VS

International company requires PL/1 programmers for the following U.K. locations: Central London, Herts, Hants, Bucks & Cheshire. Applications are commercial and the hardware is IBM 370/145 & 188 under O.S. but QDS/VS programmers will also be considered if they are prepared to switch to O.S. The client wishes to recruit project leaders, analyst programmers, senior & junior programmers, 2-7 years' PL/1 is required within a commercial environment. Some positions could involve U.K. travel. Salaries will be above average and dependent on experience.

Project Leaders £3,000-4,750 p.a.
Analyst Programmers £2,100 p.a.
Senior Programmers £2,800-3,500 p.a.
Programmers £2,000 p.a.

Database and online applications experience would be considered very advantageous but in any event training will be given to second batch oriented programmers. The company operates a flexible system and will pay relocation expenses where applicable.



Telephone 01-491 4436 (10 Lines)
340 Oxford St. London W1N 9EA

TECHNICAL SUPPORT OFFICER

The duties of this post are to supply technical support to the production team, and also the VME-18 operating system to be used on the Council's ICL 2960. The job will primarily be to assist the Chief Technical Support Officer in the creation and maintenance of a satisfactory operating environment. At least 1 year's support experience is required.

Application form from Personnel and Management Services Officer, London Borough of Greenwich, Pegg Middleton House, 50 Woolwich New Road, London SE18 8HQ Tel: 01-834 8888 Ext 2119.

Closing date: 24th November, 1978.

The Council is an equal opportunities employer. All applicants will be considered, irrespective of sex or country of origin.

GREENWICH

Are the joys of working on your current system wearing a bit thin?

Our client, a leading international firm of chartered accountants have developed some of the most sophisticated computerised audit techniques. The systems take much of the routine out of auditing.

They have developed, and operate a wide range of software packages which are compatible with both the operations and scale of their clients, which range from small businesses to international conglomerates covering just about every area of industry and commerce.

They can therefore offer programmers a very unusual opportunity to work on a very wide range of projects and systems and gain a breadth of experience that is unlikely to be offered by industry.

You will need a good understanding of commercial business systems, including the principles of double entry book-keeping, around two years' experience of working on large mainframe machines using COBOL ASSEMBLER or PL-1 and good experience of systems documentation.

Training will be given in auditing principles and the use of computer audit techniques, which will enable you to take early responsibility for providing technical support to their accountants and developing and testing new audit interrogation programs.

Salary will be negotiable around £5,000.

Please write to Malcolm Kennedy, Royds Recruitment, Royds House, 5-7 Mandeville Place, London W1

ROYDS

Royds Recruitment Ltd., Royds House,
Mandeville Place, London W1M 6AE.

COBOL PROGRAMMERS

SCOTLAND, YORKSHIRE AND NORTH WEST

Support opportunity to join small dynamic team. Excellent salaries and conditions. Interesting, challenging, varied work. Full-time or part-time/freelance.

Telephone: Knutsford 53417 or 061-238 9751



JUNIOR PROGRAMMERS

£3800 to £4750

Just a year exp. or less? Move now and get a rise!

ALL AREAS

01 995 3883

FREEPOST LONDON W4 3BR

Join the Computastars

Rowntree Mackintosh recently won individual and team titles in the COMPUTASTARS competition at Crystal Palace. We would like to offer you a place in a winning team.

We are looking for experienced (and fit!) programmers to join our computer programming department at the York head office of the Rowntree Mackintosh group. This is a busy department of about 6 programmers who, working together in small teams, develop and support programs which cover most aspects of our business.

Our computer installation is one of the largest in the north of England. We have an IBM 370/158 running under VS1 and an IBM 370/148 running under VM/370 and use CMS for the interactive development of programs. In 1979 the 370/148 will be replaced by a 3032 operating under MVS and TSO will replace VM/CMS for program development. Many of our applications use data base and teleprocessing techniques with TOTAL DBS and TASK/MASTER.

A training course will be designed to suit your particular needs and will include training in the use of data base, teleprocessing and interactive program development techniques.

Applicants should have been educated to 'A' level standard or higher and have at least a year's programming experience in a high level language, preferably PL/1, although COBOL, APL etc would be considered. Knowledge of data base and teleprocessing techniques would be an advantage.

If you are interested and have the background specified, please write (quoting ref. FY. 603) to Miss D. M. N. Dick, Staff Office, Rowntree Mackintosh Ltd., York YO1 1XY.



Rowntree Mackintosh

Exceptional careers in computing for REAL-TIME Designers and Programmers.... who know what they want and where they are going

We have a great many opportunities that reflect the large number of real-time projects Software Sciences is working on. Projects in defence, ATC, and process control — often complex, always challenging, and all very important. This is the sort of work which is the test-bed for advanced software and systems. It's where the standards are highest; where hardware technology, systems design, and programming make the most exacting demands on individual skills; and where innovation becomes a reality.

We have vacancies at a number of levels, from programmers with a minimum of three years experience to systems designers with, say, eight years plus in computing. The one thing which all candidates should have is the desire to succeed. Software Sciences will give you your opportunity — regardless of how you measure success.

You may be motivated by ambition, achievement, reputation, money, or responsibility. You will be able to choose the career path you want — whether it takes you into management or in pursuit of technical excellence. Wherever you feel you fit, as a vital member of Software Sciences you will be part of a successful expanding group of companies which gives you both security and opportunity.

Our vacancies are based in Farnborough, Macclesfield, and London, and may involve project work on-site. Salaries will depend on experience but they, and the benefits offered, are unlikely to fall short of expectations.

The coupon indicates the type of experience we are looking for. If you are interested please complete it and return to Sarah Chambers at Farnborough. You may, if you prefer, contact her by telephone or letter for further information or for an application form.

Why Software Sciences

Software Sciences is the leading international computing systems house, with a reputation for innovation and technical excellence. It has a long history of providing high quality, reliable, and cost-effective software solutions for a wide range of clients, from small businesses to large corporations. The company's success is based on its commitment to excellence in design, development, and support. It has built up an extensive design and build capability in microprocessors; it pursues a successful software product policy, and it was the first software house to establish a distinct R & D Facility. The Group now has offices in Farnborough, London, and Macclesfield, subsidiaries in Warrington, Bedford, and Rugby, and an international operation with bases in Holland, Germany, Belgium, Sweden, and the US. That combination does more than give the Group the resources, skills, and experience to stay at the forefront of the industry. It also provides all its staff with the career opportunity, job variety, corporate stability, rewards, and incentives they need to reach the top of their profession.

Name: _____
Address: _____
Telephone Number: (daytime) _____
(evening) _____
Years computing experience: _____
Hardware experience: _____
DEC _____
Data General _____
Ferranti _____
Burroughs _____
GEC _____
Software experience: _____
Coral _____
RTL 2 _____
Assembler _____
BASIC _____
BASIC+ _____
Argus Software _____
Burroughs Software _____

Defence systems
Command and control
Air Traffic Control
Flight Data Processing
Structured design
Mascot
Process control
Sequence control
High integrity systems
Distributed systems
Software reliability

Software Sciences Limited
Abbey House 282/282 Farnborough Road, Farnborough, Hampshire GU14 7NB
Telephone 0252 44321
Offices in Amsterdam Brussels London Macclesfield Rugby Stockholm Wiesbaden

Ever felt your present position would suit someone less capable?

With our current expansion and heavy investment programme we have vacancies for experienced Systems Analysts and Senior Programmers to design and develop new systems for our fast growing ICL computer installation.

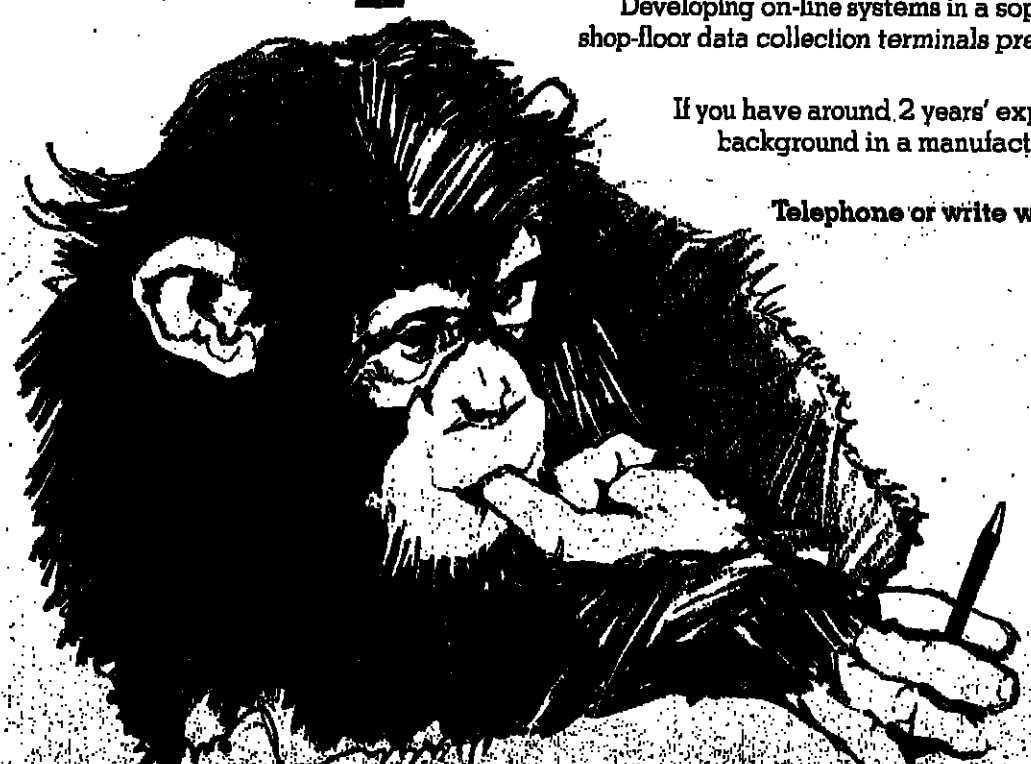
Developing on-line systems in a sophisticated production control environment using VDU's and shop-floor data collection terminals presents challenging opportunities for the right professionals to channel their talents into a fast developing project.

If you have around 2 years' experience and are either an Analyst with a production control background in a manufacturing industry, or an experienced Programmer with COBOL fluency, we'd like to meet you.

Telephone or write with brief career details, to Ron Rumbol, Petters Limited, Staines, Middlesex. Tel: Staines (81) 51393.

Realise your potential at Petters developing and programming our brand new system.

HAWKER SIDDELEY PETTERS LIMITED
Diesel Engine Manufacturers



Software Specialists

NEED **RECOGNITION AND REWARD!**

OUR SOFTWARE SPECIALISTS GET BOTH

BECAUSE THEY

OWN

WE NEED YOU because the major manufacturers of Europe need us to develop commercial applications for their small business systems.

Their problems include development of hardware, operating systems, languages, APPLICATION PACKAGES, marketing of existing products and new products based upon microprocessor technology.

Holland Automation provides THEM with the complete solution.

Holland
Automation
International



**SOFTWARE
HOUSE**

Holland Automation International (UK) Ltd.
459 Bath Road
Slough SL1 6AA
Tel: 06286-65232

You are a programmer able to discuss and design solutions for clients and then implement them because your experience includes assembler and high level languages together with a sound understanding of the commercial applications of small business systems.

Your present company provides you with a good salary, a car and a package of benefits — *but does it really distribute all of the profit entirely to employees?*

Holland Automation does both to provide you with the complete solution

Ring and ask for Ian McEwan who will provide you with information, assess your experience and immediately arrange an interview.

SIEMENS

The Word Bank is open for business

As a member of the computer industry, you'll already know that in the fast-growing word processing segment the rewards are practically limitless.

Siemens, whose word processing system is amongst the European market leaders, has recently introduced the 'Word Bank' into the UK and is looking for new members to join an enthusiastic team.

Software engineer/analyst Word processing sales

If you're the person we want, you may be feeling you're in a technical 'cul de sac' and that your specialisation in computer industry technology is holding you back from meeting people.

We'll want you to be involved in client contact. Of course, you must have proven technical know-how and experience but, just as important, you need to understand the business problems and potential of customer-clients. You'll be dealing with senior management and discussing benefits and applications of our 'Word Bank' system. There's an attractive salary, in line with experience.

If you're the person we're looking for here, you'll almost certainly know what we're looking for. Very simply, it's selling experience and a proven record of success.

The Software Engineer/Analyst advertisement alongside should show you the way we think and the kind of support you'll get. There's an attractive salary and commission package.

For both positions there's full training and the benefits of working for a company employing over a quarter of a million people world-wide.

If you think you've got what we want and we may have what you are looking for, contact Tony Weeks, Personnel Manager, Siemens Limited, Siemens House, Windmill Road, Sunbury-on-Thames, Middlesex, Telephone Sunbury 85691.

These vacancies are open to male or female applicants.

Programmers & Analysts

Middlesex/Hertfordshire £6,600 p.a.

A Data Processing Department is the backbone of any successful company, especially if the company is a Multi-Million Pound Manufacturing Organisation with a turnover in excess of £1,000 million.

That is why we would like to hear from PROGRAMMERS and ANALYSTS who can become members of the team for the development of new Commercial applications.

The installation presently runs dual 1900's under G2+, but owing to the continual demand from users, one of the 1900's is shortly to be upgraded, probably by a 2980.

Programmers will need at least 18 months' experience of Cobol, knowledge of G2+ and Datadive would be an added advantage. Analysts will need a Programming background, with 18 months' Analysis experience, although Programmers who wish to advance their career into Analysis will also be considered.

The Company can offer an excellent career path through to Management, plus the usual benefits of a large company which includes Staff Shop, Sub canteen, Sports Club, Life Assurance and 4 weeks' holiday per year.

Ref CW 45/1

Systems Analyst

Dublin

£7,500

An International Company requires an experienced Systems Analyst for a new development. Good commercial systems experience in a DOS/VS environment would be ideal, but successful candidates must have completed at least one decent commercial system. A programming background in Cobol would also be a help.

A top class salary and conditions of employment will be offered to the right calibre of applicant. Career prospects are good and relocation expenses will be provided where necessary.

Write or telephone Gerald Delamere at Dublin 789577.

Ref CW 45/4

Software Engineer

IBM Experience

Middlesex/West London

The Data Communications Division of a £3 Billion Corporation operate a small and highly successful company employing about 80 people World Wide. The bulk of the day-to-day sales and support is handled by about 37 distributor companies in over 40 countries.

One of the main functions at this nerve centre is the on-going new product evaluation. The continual process of introducing new product lines to the existing Hardware and Software range stimulates work content and job satisfaction for the people involved.

Plans for 1979 involve the introduction of many new products which will have to be evaluated, tested and supported through distributors. An important new product range incorporates a direct channel interface into IBM mainframes. Accordingly for this appointment, we need candidates with experience of IBM or IBM compatible equipment. Specifically, we need people with experience of IBM software including access methods, TP Software and interfacing with mainframe environments.

This appointment calls for a highly qualified individual who has the strength and ability to evaluate market trends, organise training facilities and to take responsibility for his/her own specialised area. Long term opportunities exist for movement and growth within this tight knit organisation.

Ref CW 45/7

Opportunity in Sales

London, W1

£9,000 on quota

A unique opportunity has arisen for sales people to join a young and rapidly expanding Bureau and Systems House, who can offer ground floor opportunity to the successful candidates.

The Company, situated in W1, has a Prime 400 and sells both Application Software and Time. The applications are mainly financially orientated so you will be selling to Accountants and Financial Directors.

The successful candidates will be aged in their mid-20s, and have had 2 years' selling experience, preferably in a Commercial environment, but this is not essential as full-time training will be provided. It is envisaged that your career path will give you the opportunity to move into management with the growth of the Company.

Ref CW 45/2

Hardware Systems Engineer

MIDDLESEX

The Electronics Division of a Multi-National company based in Middlesex need to increase their support team on their MINI Communications Hardware. The company uses distributors for day to day sales and support.

They require an experienced Hardware Engineer to join a small team in continually evaluating new Hardware products to add to the companies existing product range.

Candidates should have an academic qualification Electrical/Electronics Engineering, direct Hardware Support, write their own test programs, exposure to training and product launches.

This is an ideal opportunity for an experienced engineer to join a small dynamic team supporting communications Hardware and evaluating and testing new potential products at the forefront of the industry.

Ref CW 45/5

European Systems Support

West London based

to £7,500 + car + benefits

Although a relative newcomer to the European Market, our clients, a remarkably successful company in the Data Communications sector of the industry, require a Senior Systems Consultant to join their European Support Centre.

Working in a small but highly powered support group, the successful candidate will report directly to their European Systems Manager.

Essentially this position is of a consultancy advisory role, providing pre and post sales support to customers in the UK and throughout Europe. When given the necessary training, the ability to handle and find solutions to customers' problems is essential.

Candidates should have worked in a marketing environment already, in an inter-active communications field. Experience of IBM 3270s or compatible equipment would be ideal.

In summary, this is a position for a highly talented individual, who has the initiative and appropriate skills to make an important contribution to the company's success. Rewards include a competitive salary, car, generous relocation expenses in addition to travelling expenses to Europe and the United States.

Ref CW 45/8

GERMANY Programmers with 2 years +

An expanding German Software House currently require programmers with just 2 or more years' experience in programming on the following machines

DEC PDP 11
Honeywell Level 6
Siemens 330

They have opening for Applications Programmers and Systems Programmers.

If you have considered moving abroad and have now got sufficient skills in one of the above areas, then our client can offer you full-time employment on a variety of projects.

The ability to speak German or French would be useful but not essential. Salaries and company benefits are attractive in accordance with local market conditions.

Ref CW 45/3

System Programming Consultants for Distributive Projects

West London

up to £9,300

A major international Software House has a need for the following specialised people -

- * Programmers with Assembler ICL 7502 16 Bit Communications Controller interfacing to a 2980.
- * Programmers with in-depth Singer 1501-1502 experience, which is linked to a IBM 370/148

They also have a need for experienced Programmers to work on large sophisticated 2900 projects using IMS and TP. The Company can offer an excellent salary package with the usual fringe benefits one would associate with a Company of this size.

Ref CW 45/6

Senior Analyst for New Installation

London 370/138

up to £8,000

One of the few opportunities today has arisen for a qualified Senior Systems Analyst to join a New Installation, an IBM 370/138 which has just been delivered.

The nucleus of this department is currently being recruited and will be expanded next year. The successful analyst will report directly to the Data Processing Manager and will be responsible for their own project including the programming function.

Candidates should have at least 5 years' D.P. experience and have worked on 2 projects, through to implementation. Experience of IBM Hardware would be helpful and Financial Business Systems would be ideal. The company have an existing Mini Based Communications Network and the support of these systems will provide interesting development projects in future.

Ref CW 45/9

Central Computing Consultants

KINGSTON: 44 Wood Street, Kingston upon Thames, Surrey, England. Telephone 01-549 3212 Telex 27950

DUBLIN: Canberra House, 24 Lower Leeson Street, Dublin 2. Telephone 789577 (5 Lines)

Licensed initially by the Dept of Employment No SF (B) 170

Dep 45/10

The new name in recruitment

People

Sales Executive

Manchester
up to £8,000
Sales Executive with ICL experience required by rapidly expanding company. Our client requires a specialist in software packages and intelligent terminals.

Software Consultant

U.K. & Europe
£6,500-£9,000
Must have ICL systems and programming experience; be highly self motivated. Extensive travel.

Branch Manager

London
circa £10,000
To develop business in London and the South East. Responsibilities to include managing an expanding team of computer specialists. Organising ability essential.

Sydney, Melbourne & New Zealand

\$A14,000-20,000
Applicants should have online experience preferably with TPS, and have written a system spec. for a major application.

\$A14,000-20,000
Applicants should have a minimum of two years' 1900 experience. TPS experience an advantage. Interviews will be held in U.K. late November.

London, Home Counties & Manchester
£3,000-£3,500

Large range of client companies require programmers with minimum of 18 months' experience preferably COBOL.

up to £6,000

To develop and enhance systems. Experience in stock control, order entry, pay roll applications etc. an advantage. Must have implemented at least one major system.

Manchester, Oxford, London
up to £6,500

To run a team of programmers and analysts, and to control and implement major systems.

Oxford
Salary negotiable

The ideal candidate will possess extensive 1900/2900 experience and training skills. People with compatible experience in either programming and/or system design and a strong training motivation will be considered.

Registration/Enquiry

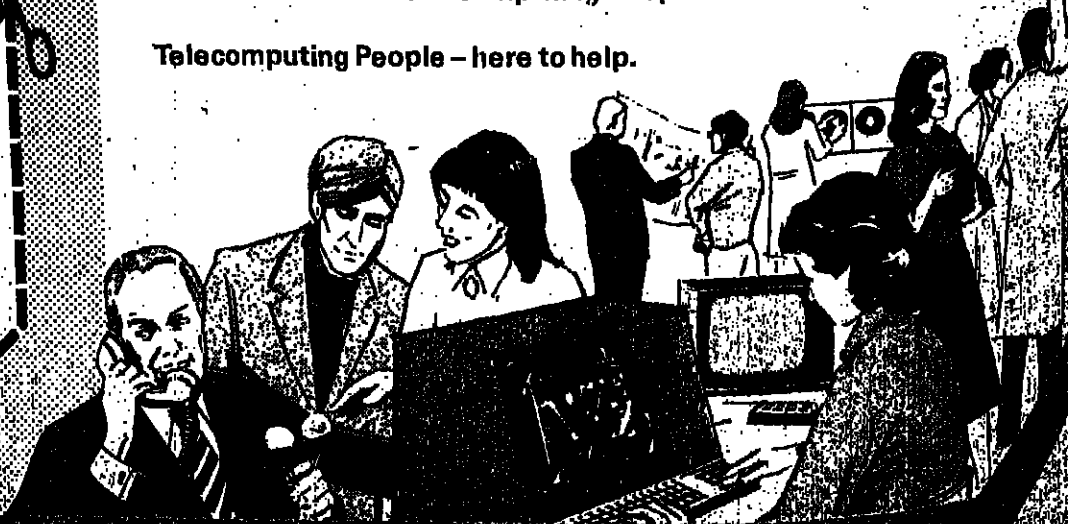
Name _____
Address _____
Telephone Home _____ Office _____
Current Position _____ Age _____
Position Required _____ Salary Present _____
Brief Career details _____
Date _____
Signature _____

Telecomputing People have the right credentials - they're part of Telecomputing, the company that developed T.P.S. and launched it Worldwide. Telecomputing People have the right contacts and many computer vacancies in the U.K. and overseas. The appointments listed on this page are just a small selection. If you are interested in any of these vacancies, phone or write to Chris Swinbank or Jenny Oslar.

Telecomputing People
Between Towns Road
Headington
Oxford
Phone (0865) 723621

If you have a general enquiry or wish to register with us, spare a few minutes and phone, or simply fill in this coupon, cut it out and send to Telecomputing People.

Telecomputing People - here to help.



People depend on packages

UNIPAY UNIPERSONNEL UNIPENSION

NOTTINGHAM/PETERBOROUGH

SALARIES TO £6500+
SUBSTANTIAL FRINGE BENEFITS

Our clients, Peterborough Data Processing Services, are a highly successful well respected software service organisation, whose commitment to commercial package technology has ensured their success both within the United Kingdom and internationally. Client base expansion, has led to the necessity to recruit further KEY members, wishing to develop their potential by joining a team structured, developing organisation.

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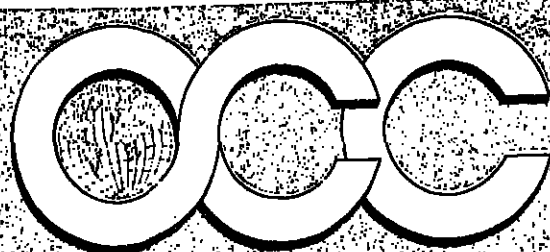
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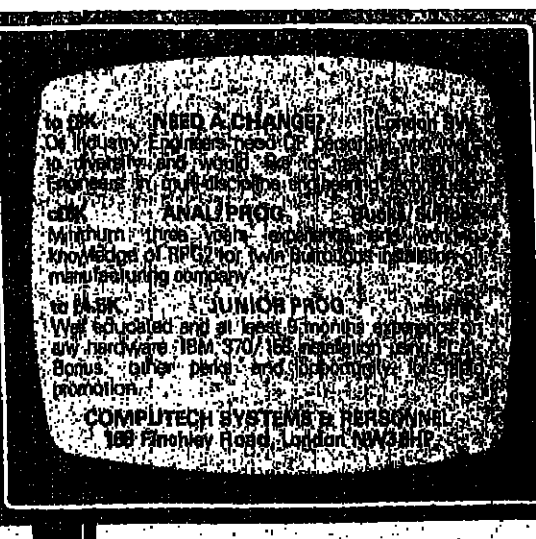
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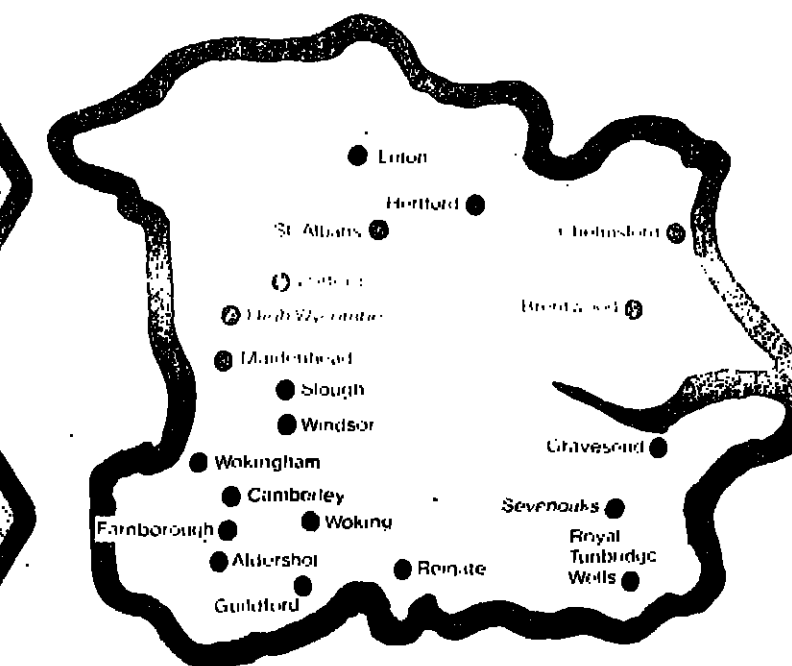
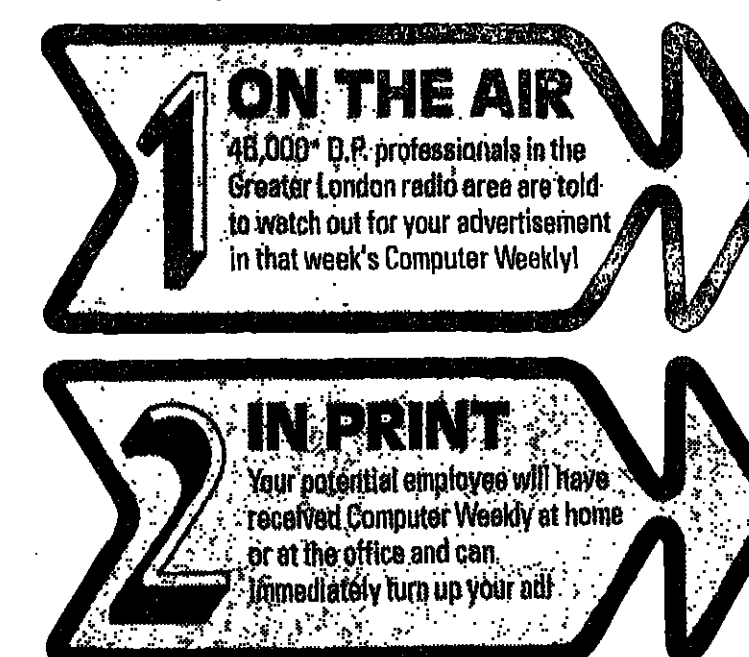
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Wimbledon, S.W.19

9th October, 1978

Dear Analysts and Programmers,

Next week we will be featuring a large advertisement for Analysts (Commercial and Financial) and Programmers (COBOL or RPG) to work in our interesting Consultancy and Software House environment. One of our major projects is a complex on-line system, so experience in this area would help. (We have our own computer for interactive development).

Although primarily requiring permanent staff, we could also be interested in a small number of contractors.

If you cannot wait for full details next week please phone or write to George Gillespie or myself, immediately.

Yours sincerely,

STUART HOWARD
Programming Manager

INMS ***** STAR OPPORTUNITIES SHEFFIELD

Our client wishes to recruit the following additional staff.

SENIOR SYSTEMS ANALYSTS
c£6,000

SYSTEMS ANALYSTS
c£5,500

SYSTEMS PROGRAMMERS
c£5,500

These positions, with a progressive company, offer excellent long-term career prospects and involve the development of extensive new systems covering all aspects of the company's operations. Good salaries. Relocation expenses.

Invitation

INMS requests the pleasure of the company of Systems Analysts and Systems Programmers to discuss these outstanding opportunities at an

Open Day at the
Grosvenor House Hotel
Charter Square, Sheffield

Thursday 16th November 1978 9.00 am to 9.00 pm
Telephone: Sheffield 20041
No appointment is necessary.

If you cannot accept this invitation please telephone to make an alternative appointment.

Ivor Norton Management Services Ltd
Recruitment Consulting Division

P.O. Box 63, Copthall Tower House, Harrogate HG1 1TS. Tel. Harrogate 66628.

CLASSIFIED COPY

All classified copy should reach our offices no later than 5.30 p.m. on the Monday preceding Thursday's publication. If complete artwork is supplied 12 noon on a Tuesday.
Ring Ian Carter for further details on 01-261 8016.

"P and who?"

"P & S, Programming and Systemsolve"

"Oh, Programming and er... and..."

"Just remember P & S"

"Oh yes, P and er..."

"Phew, I wonder if P & O have this trouble?"

OK, so we're not a household name, but you can bet some of our clients are.

The positions registered with us cover the whole DP spectrum, from COBOL programmers, to systems analysts, to high flying salesmen. They are located throughout the UK and the salaries will match your experience and ability.

So just ring us or fill in the coupon and remember: P & S is the name.

Name:
Address:
Tel no:
Position sought:

30 Baker Street
London W1M 2DS

9-11 Tatten Street
Knightsbridge
Chesham WA16 6AB
Tel: 0665 4925



Programmers, Analysts Project Leaders

If you wish to work in the North try us for size

PMSL is the Computer Services Company within the Provident Financial Group. They provide a comprehensive data processing service to the Group and external users. Continued expansion has created a need for additional development staff at all levels, to supplement the existing team based at the new purpose-built premises in rural surroundings just outside Halifax, West Yorkshire

At PMSL we are sure you could find a job that fits! The range of applications and equipment can almost certainly meet your requirements.

Equipment includes a Univac 1106, 2 x ICL 1904s, minis and micros and plans for substantial new equipment in the near future.

Most applications are based on communications and data base techniques. If you have this type of experience or would like to get involved with really modern systems development, we would like to talk to you. With this in mind, we have arranged for members of our development team to be available to talk to you at five different locations in the North, Midlands and London during the week commencing 13th November.

If you are unable to attend the informal interviews, then telephone or write to Mike Sands quoting ref. 2040/CV

As well as a first-class salary, we can offer really worthwhile benefits including:

- ★ 4 weeks' holiday
- ★ Quarterly review periods
- ★ Subsidised restaurant
- ★ Discount shopping
- ★ Substantial training
- ★ Pension and life assurance scheme
- ★ Generous relocation package



**Provident
Management Services
Limited**

INFORMAL INTERVIEWS

Tuesday, 14th November
The St. George's Hotel
Langham Place, LONDON. W1
The Metropole Hotel, King Street
LEEDS

Wednesday, 15th November
The Portland Hotel
3-5 Portland Street
Piccadilly Gardens
MANCHESTER

Thursday, 16th November
The Royal Victoria Hotel
Victoria Station Road
SHEFFIELD

Friday, 17th November
The Plough & Harrow Hotel
Hagley Road
Edgbaston, BIRMINGHAM

You've got two days to find the job of a lifetime

November 17th & 18th

To talk informally about your career with our top management at the **BRITANNIA HOTEL, GROSVENOR SQUARE, W.1.** come to the Grosvenor suite between 9 am & 8 pm on either day and we'll tell you why we're the most successful and fastest growing computer company in the business today.

Senior Sales Executive - on target c£16,000 + car

A proven track record as a computer sales professional with mainframe/mini experience in general data processing and a good knowledge of scientific and/or commercial applications will open the door.

Motivation, determination and personality is what you need in our highly professional sales team where achievement spells high rewards.

Support Consultants - to £8,500 + car

Experienced in pre/post sales situations covering scientific Engineering and/or Commercial Applications on mainframe or mini computers. You will have a degree or higher diploma with a thorough working knowledge of one or more of the following areas: File Management Systems, Database, Operating Systems, Language Compilers, Graphics, Scientific and Commercial applications.

Senior Training Specialist - (Database) to £7,500 + car

This industry recognised professional team has established a high reputation for designing and implementing customer training courses. To join you need a solid commercial background with COBOL and 3-4 years experience of Database Systems.

An excellent career opportunity can be yours as PRIME's Database (DBMS) is CODASYL compliant and a market leader.

Field Engineers - to £7,000 + car

Your preventive and corrective maintenance experience either in PRIME's product lines or with similar equipment, will sharpen your chances for a top career in a top team. Naturally you'll be expected to test and install new equipment and undertake challenging modifications, because you're self-motivated and have the ability to satisfy our customers. With an HNC/ONC in Electrical Engineering or City and Guilds Telecomms you'll also have a minimum of two years experience in the industry.

We are looking to fill these and other positions in the following locations:
Glasgow, Manchester, Birmingham, Bedford, Maidenhead and London.

You'll have excellent career prospects with PRIME enjoy an extensive range of benefits and most of all, be with No 1.

If you can't come in on the 17th or 18th please write to Roger Parsons - Marketing Director or call us anytime - 01-572 6241. We'd like to hear from you.

PRIME Computer (U.K.) Limited,
The Hounslow Centre,
1 Lampton Road,
Hounslow, Middlesex.

PRIME



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PLUS ANY ONE OF THE FOLLOWING WOULD BE HELPFUL
- 3 **2903/SYS 3, RPG II**
- 4 **SYSTEM 10, 15 - ASSEMBLER**
- 5 **ASSEMBLER, PL/I, CICS**

WE WILL OFFER YOU

- ★ A personal health scheme covering sickness for 6 months
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If you are a professional and want to be treated like one contact:

**PETER TUGGEY at
DIRECT PROGRAMMING
SERVICES**

**51 LONG LANE, WEST SMITHFIELD
LONDON, EC1**

Tel. 01-606 1738/1739/1730
(24-hr. service)

Licence No. SE(A)3081



City of Manchester Treasurer's Department System 4 Computer Operators

The City Council is to introduce 3 shift working on an I.C.L. System 4/72 computer in January 1979. The present configuration includes 612K bytes store, 18xEDA 60/30, 7 & 9 track Mag. tape and a large on-line communications network. Additional operators will be required and applications are invited from suitably qualified operators for the following posts.

Senior Operator

(Deputy Shift Leader) - with a minimum of 3 years' experience of System 4 - J operating system - Salary £3,888-£4,908 p.a. inclusive.

Operators

- with a minimum of 2 years' experience of System 4 - J - Salary £3,321-£4,314 p.a. inclusive.

Junior Operators

- with a minimum of 1 years' experience of System 4 - J - Salary £2,121-£3,888 p.a. inclusive.

All above salaries are inclusive of shift allowance for 3 shift working and supplement of £312 p.a. The average working week is 36 hours, and other conditions include excellent sickness and pensions provisions and leave entitlement. A contribution may be made towards removal expenses in appropriate cases. A new computer is envisaged in the early 1980's.

Applications stating age, qualifications, experience to date, and the post applied for, should be addressed to the City Treasurer, P.O. Box 314, Town Hall, Manchester M60 2JH. The City Council operates a Union Membership Agreement under which a new employee is required to become a member of a recognised trade union.

Contract
Urgent

Univac 1100 Cobol
LONDON

IBM DOS Cobol
**LOCATION
BRUSSELS**

Phone: Paula
01-946 4424
METEOR

DATABASE

SENIOR DATABASE
ADMINISTRATORS & DESIGNERS -
LONDON & EUROPE

The U.K. and European divisions of a U.S. public Corporation have openings in their London & Zurich offices for Senior Database Administrators, Designers and Applications personnel with extensive Database experience using any of the proprietary DBMS currently in use on major main-frame and mini systems. Of particular interest are persons with experience in IMS, TOTAL, ADABAS, DMB, IDMS etc. Hardware backgrounds and of file structures - what is essential is the depth of experience in your relevant area of Database expertise. Our client is anxious to maintain its prestigious standing world-wide by attracting proven and potential talent to join them in the development of advanced Database projects in commercial and technical environments.

Grade 1 Salaries: £5-10,000 p.a.
Grade 2 Salaries: £7-10,000 p.a.
The opportunity to travel within Europe and the U.S. is available. Interviews will be held in London during the next three weeks.

MATRIX

Telephone 01-491 4634 (10 Lines)
200 Colindale Avenue, London NW9 3DA.



JOHN GOLDSMITH (Computer Recruitment) Ltd.

WE ARE ALWAYS INTERESTED IN HELPING YOU WITH YOUR CAREER
Goldsmith Recruitment International Ltd., 15 Buckingham Palace Road, London S.W.1.
Tel: 01-828 5356 - 24 hour answerphone service.

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c. £15,000 p.a. + + +

Have you sold £½ million systems (or larger)?
Can you sell at very senior levels?
Can you manage large sales campaigns?
Can you manage and grow existing large installations?

Would you like a Sales Management position, and the prospects of an excellent career with a Major International Computer Manufacturer?

The money is excellent. You will earn approx. **£15,000** p.a. with prospects for much more. First year guarantees are made up of base salary and non-returnable guarantees equaling **£10K-£12K**. Commission / bonus paid in addition.

This is a superb opportunity to join a professional company at management level, who look after their people.

Please telephone the Senior Consultant quoting Ref. No. CW 180.



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LONDON W1M 4AJ
Tel: 486 5644



EUROPE BELGIUM

Analyst / Programmers to Senior Systems Analysts Excellent starting salary plus relocation expenses

Our client, a major multinational company, has their European Headquarters in Belgium. They are currently reviewing their hardware and systems throughout Europe and wish to recruit a number of people to assist in this task and subsequent development.

The successful applicants will be based in Belgium. Although there will be a considerable amount of travel, time away from home need not be extensive.

Experience is required in RPGII and commercial or manufacturing systems. Knowledge of Order Process-

ing or Inventory Control systems would be a definite advantage. Most important is flexibility of attitude.

If you have relevant experience, the right personality and like the idea of working in a dynamic international environment, we would like to meet you. The positions offered are genuinely exciting.

Initial interviews will be conducted in London and there will be an opportunity to visit our client's European Headquarters for selected applicants.

Ref. 2039/CW



WE ARE ALWAYS INTERESTED IN HELPING YOU WITH YOUR CAREER
John Goldsmith (Computer Recruitment) Ltd., 15, Buckingham Palace Road, London, S.W.1.
Tel: 01-828 5356-24 hour answerphone service.

JOHN GOLDSMITH (Computer Recruitment) Ltd.

In the New Year you could be with a small progressive team developing application packages for worldwide distribution, working for the UK Division of Burroughs International, you will be based in Feltham just 21 minutes from Waterloo.

If you are self-motivated, capable and ambitious, these new positions in the Applications Research and Development Centre will allow you to utilize and broaden your experience in developing new banking and commercial systems.

PROJECT MANAGER (1)
SNR. SYSTEMS ANALYST (2)
SNR. COBOL PROGRAMMER (1)
SYSTEMS ANALYST (2)
COBOL PROGRAMMER (2)
JNR. ANALYST (1)
JNR. PROGRAMMER (1)

£4600-£8000 (neg.)

In addition to challenging and rewarding career paths, Burroughs offer high salaries and many opportunities for international travel. Although an understanding of foreign exchange, accounting or banking procedures would be useful, Burroughs will provide comprehensive and ongoing training schemes whatever your data processing experience.

Burroughs — 'A success story' — join them in 1979 and achieve further success together...



Fifteen years ago it was widely predicted that Burroughs together with the likes of GE and RCA, were doomed. Now they are the number two company in the industry and the only one that has come consistently close to matching IBM in the ratio of net profit after tax to sales. The financial record over 15 years shows nothing but astounding success...

Reproduced with permission from COMPUTER TALK 27/10/78

EUROPEAN OPPORTUNITIES

JUNIOR PROGRAMMER

Can you speak French, German and RPGII? Manufacturing Company is looking for a young (22-30) Programmer to support installations in FRANCE and Germany. The successful applicant would be nominally based in Hampshire, but would spend about Two Thirds of the year abroad. A European level salary and very generous expenses make the financial package extremely attractive.

For an interview THIS WEEK phone Continental CLAIRE, and quote REF. 248.

TRAINEE COMPUTER ENGINEERS FRANKFURT AU-MAIN

A large American Mainframe manufacturer has a number of vacancies for TRAINEE SERVICE ENGINEERS to work on a U.S. Government Contract in Germany. Whilst experience in Computer Systems is not necessary, all applicants MUST have had some Formal training in Electronics, and will have to take an aptitude test as part of the selection process.

Full training in Computer systems and relocation for both applicant and family will be provided.

Phone VERA and quote REF. 248.

KEY COMPUTER PERSONNEL

01-949 5851

EXCELLENT OPPORTUNITIES FOR CONTRACT STAFF

In line with current expansion plans we will be pleased to hear from programmers, analysts and consultants of professional disposition with a solid background in any of the following disciplines:

MARK IV FORTRAN
COBOL BASIC
PL/1 RPG
BAL

and any DATABASE or TP MONITORS

Forthcoming internal projects include developments on in-house equipment. Current external projects cover U.K., Europe, U.S.A. and the Middle East.

Please telephone or send career details to:

MARGARET DRISCOLL
TANGENT COMPUTER SERVICES
BROOK HOUSE, 4 EASTERN ROAD
ROMFORD, ESSEX RM1 3PJ

Tel. ROMFORD 0708-44181/2

Top contract fees

URGENT
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Configuration consists of 32K I.C.L. 2903 with ED560, FEDS and DDEs. This system also links to an I.B.M. 370/158, an I.B.M. System 3 and other computer equipment used in laboratory environments.

To support our system development plans vacancies exist for

A) ASSISTANT COMPUTER OPERATIONS MANAGER

SALARY: £4,888-£5,588

The successful applicant will be responsible to the Computer Operations Manager for the day-to-day running of the installation and the direction of Operations and Control Staff.

Duties will include job scheduling, security, close liaison with Users, systems, and maintenance of procedures.

Ideally, candidates should possess:

1. Minimum of three years' Computer Operations experience, preferably at an I.C.L. environment
2. Be well attuned to the realities of the operations environment and capable of maintaining a fruitful and constructive approach despite its pressures
3. A knowledge of both I.C.L. and I.B.M. procedures

B) JUNIOR PROGRAMMER

SALARY: £2,570-£3,212

At least one year's experience at I.C.L. and/or I.B.M. This is an opportunity for a Programmer to be fully involved at the beginning of new systems with a developing Computer Department.

Further particulars and Application Forms may be obtained from

THE PERSONNEL OFFICER
FEDERATED DUBLIN VOLUNTARY HOSPITALS
P.O. BOX 798, JAMES'S STREET, DUBLIN 8

To whom completed Application Forms should be returned not later than Friday, 17th November, 1978.

LEICESTER CITY COUNCIL Personnel and Management Services Department

Computer Services Division

OPERATIONS SHIFT CONTROLLER

£4246-£4632 p.a.

To be responsible for the progression of a critical work schedule during specified shifts through the City Council's IBM 370/138 COMPUTER SYSTEM

We work on a two shift basis from 08.15 hours to 24.00 hours, Monday to Friday. The successful candidate would be responsible for, and supported by, an operating team, control and services staff, and a data preparation team.

Applicants should have operating experience and a broad knowledge of computing activities. If you consider that you have the experience and stature to manage a shift's resources, then we want to hear from you.

The post offers a shift allowance of 14% and 22 days' leave per year.

The starting salary will be dependent upon experience and qualifications. Working conditions in the newly constructed office accommodation are excellent and include a staff restaurant, a system of flexible working hours is also in operation and relocation expenses are available in appropriate cases.

If you would like to discuss this vacancy please telephone Peter Ward on Leicester (0533) 549922, extension 7050. Application forms are available from the Director of Personnel and Management Services, New Walk Centre, Wellford Place, Leicester LE1 5ZG, or telephone Leicester (0533) 549922, extension 7084.

Closing date for receipt of application forms is the 20th November, 1978.



OPERATORS

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Complete the coupon and return to the address below, for your next PERMANENT or CONTRACT job.

Name (in full)		Office	
Address (Permanent)		Date of Birth	
Telephone Home	Type of Transport	Salary / Rate	Salary / Rate
Current Position		Position Required	
Contract / Permanent date		Contract / Permanent date	
Notice Required / Date Available (delete)		Areas Preferred First Choice	
Second Choice		Experience to date: (Last Position First)	
Company Name	From Mth / Year	To Mth / Year	Hardware
and Location	Operating Systems / Software		

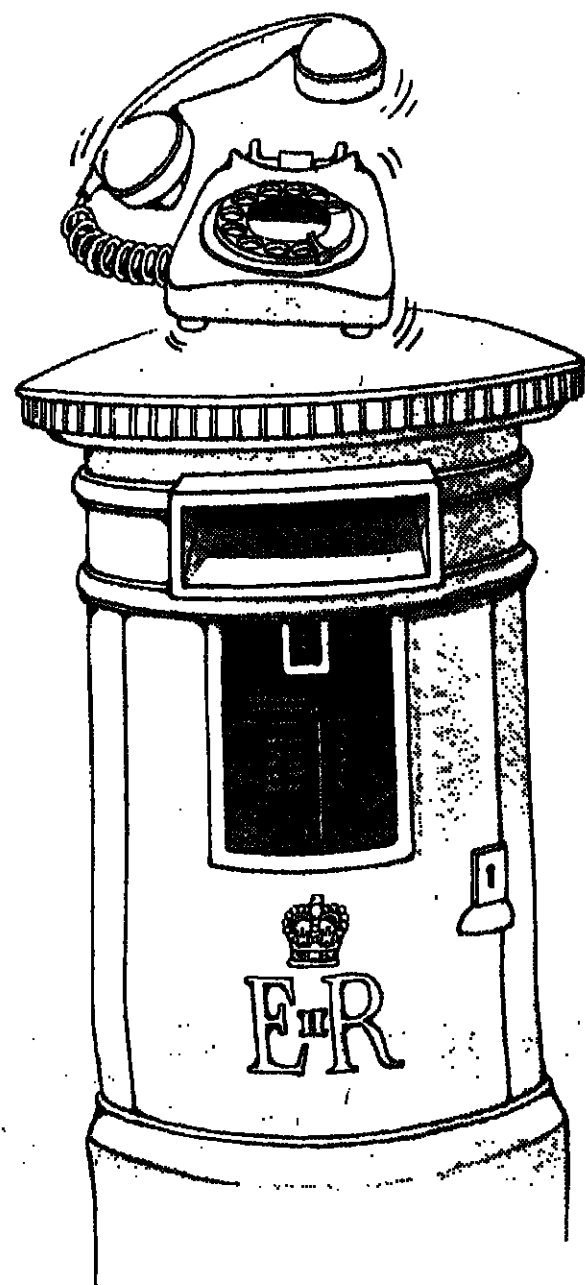
Date

Signature

EFFECTIA GRAVIS
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LONDON W1V 3HP. 01-439 8481 (24 hours)

REG No.
DATE
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Name.....

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Your kind of job.
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OXFORD UNIVERSITY COMPUTING SERVICE

has a vacancy for a

SHIFT LEADER

The Service provides computing facilities for the University based upon 2980 and 1906A central processors, with communications front-ended by 7906, 7903 and Mod 1 computers. Graphical output and microfilm are also provided. The Shift Leader is responsible for running one mainframe and its associated equipment.

Candidates for the post should have at least ten years' experience of GEORGE 3, or at least one year's experience of VME-B. Salary scale £3,060-£4,104 per annum plus shift allowance of £647 (3 shift) or £486 (2 shift).

Application forms and further details may be obtained from

Miss J. C. Latta
Oxford University Computing Service
13 Banbury Road
Oxford OX2 8NN
Telephone: Oxford 58721

Closing date for applications 27 November 1978

BIRKBECK AND IMPERIAL COLLEGES (UNIVERSITY OF LONDON)

Research Officer In Interactive Computer Graphics

Applications are invited for a three-year post funded by the Science Research Council to work jointly with Professor D. M. Blow and Professor T. J. Blundell in the development of interactive computer graphics for structure analysis of biological systems including proteins, drug molecules and macromolecule-water interactions. The hardware includes an Evans and Sutherland Picture System II driven by a PDP 11/60 computer linked to an IBM 370/185 mainframe computer. Applicants should have post-graduate experience in computing preferably with knowledge of main computers.

Salary according to qualifications and experience, within Grade 1A, entry point not exceeding £4,408 plus London weighting £450. Applications to Professor T. J. Blundell, Department of Crystallography, Birkbeck College, Malet Street, London WC1E 7HX, telephone no. 01-580 8622

SENIOR SALES EXECUTIVES

Mainframe Computers

Our client is a major international mainframe manufacturer with a highly respected reputation for producing some of the industry's most cost effective computing equipment.

We are seeking senior sales executives with a proven record of success in selling mainframe computer systems and already earning a five figure income. Our client's existing sales executives typically enjoy incomes around

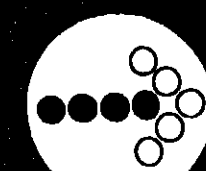
£16,000 p.a.

These job opportunities provide many significant benefits:

- REAL SCOPE FOR INDIVIDUAL SKILLS AND CREATIVITY WITHIN A FLEXIBLE AND IMAGINATIVE MANAGEMENT ENVIRONMENT.
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COMPUTER OPERATOR

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C. LONDON

Due to internal promotion and expansion of Operations, our client, International Oil Company, require an IBM operator with 12-18 months' DOS experience coupled with a sound knowledge of JCL and utilities. A successful candidate will join the existing team of 7, working on a two-shift cycle Monday to Friday.

Career progression is excellent, both in Computer Operations and internal development area as the company operates a comprehensive training scheme. Benefits include free staff restaurant, non-contributory pension scheme, season ticket loan scheme, and an active sports and social club.

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Computer Personnel International



110 St Martin's Lane, London WC2N 4BH 01 838 6778

Directorate of Finance Computer and Audit Division

Computer Auditor

FO1(a) — £8,182-£8,777 p.a.

An interesting opportunity exists for someone to develop the audit of computer based systems, computer operations and the introduction of audit techniques whereby computer facilities are used for auditing. Hackney is a member of the London On-Line Computer Consortium which uses an IBM 370/158 computer and has developed and introduced advanced financial and non-financial computer based systems, many of which function through a network of visual display units. Applicants, male or female, for this newly created post can be auditors with a sound knowledge of computing or practitioners in computing or systems analysis with a good understanding of auditing. The Head of Computer and Audit attaches importance to the need for raising the level of computer auditing, and the postholder will have ample scope to exercise skill, initiative and collaboration with colleagues in Hackney, the other participating boroughs and in LGA.

Application forms available from Head of Borough Personnel and Recruitment Services, Town Hall, 88-122, or telephone 085 5678 (24 hour Answerphone service) quoting reference 0856/900. Available by 29/11/78.

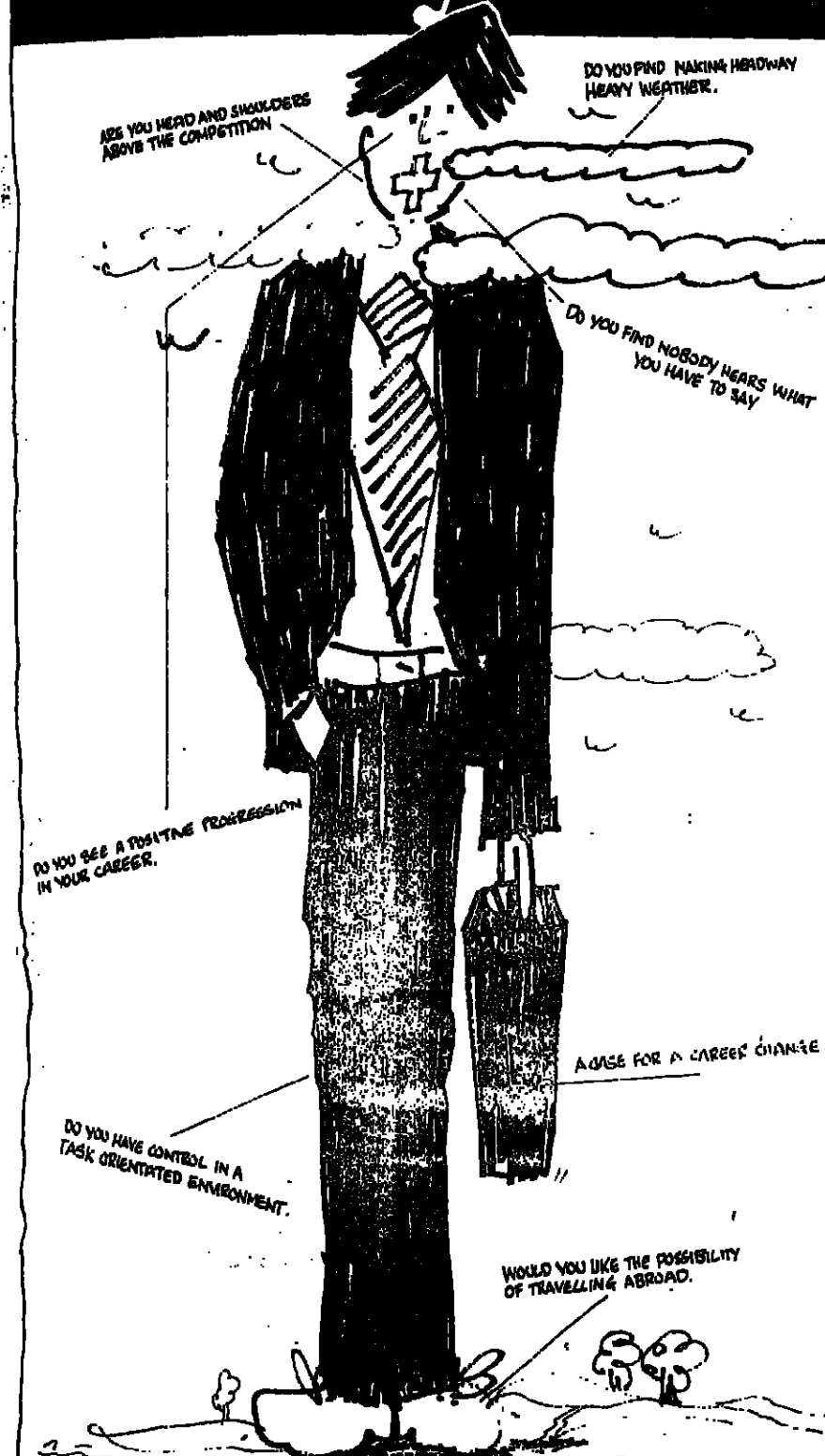
REAL TIME

★ Systems Design ★ Programming

PERMANENT or CONTRACT to work on developing INDUSTRIAL and COMMERCIAL COBOL, CORAL, RPG, PLAN, FORTRAN, WIP 5PD.

Contact: I. Gold, on 01-388 0836, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00.

Programmers, Analysts



ASK YOURSELF - YOU COULD FIT BETTER WITH ARBAT

DO YOU FIT?

ARBAT is a real success story of British Computing. Real Time Banking and Communications Systems are our areas of expertise—currently 14% of the top 50 Banks use ARBAT systems. UK and international projects are underway and we offer sound careers in Programming and Systems in a dynamic and exciting environment. Initially London based then overseas opportunities—Salaries are by negotiation, and we have a reputation of being top payers—Reviews are at least twice in year one—We offer continuous training for the future.

All ARBAT jobs are TASK oriented—and career progression is on merit and from within. Want to hear more about the other benefits? We will send you a profile on ARBAT—and arrange interviews locally—Phone or write NOW to discuss the opportunities with:

Mr. Morris Hogg at ARBAT (UK) Ltd.
400 Queen Victoria St, London, EC4V 4DA
Office No. 01-243 6199
Home No. CHESHAM (02405) 71576 after 8pm.

ARBAT(UK) LTD.

CLASSIFIED COPY

All classified copy should reach our offices no later than 5.30 p.m. on the Monday preceding Thursday's publication. If complete artwork is supplied 12 noon on a Tuesday. Ring Ian Carter for further details on 01-261 8016.

Your DP experience will travel faster by helicopter

On behalf of Bell Helicopter International, IAL are recruiting data processing professionals for a two-year contract in Iran. It is an exciting project, involving the supply of a logistics and training support service to the Imperial Iranian Army Aviation and demanding extensive data processing facilities.

A large integrated data base has already been established housing the flexible Honeywell 6000 system and the wide cross-section of DP talent we require will certainly benefit from two years in Iran.

Programmer Analyst

Four years' experience is required with at least two years' recent Honeywell experience, utilising COBOL 68 and Integrated Data Store (IDS) programming language.

Software Analyst

Two to five years' experience is desirable in the area of software support and maintenance for Honeywell's GCOS and TSS, GMAP programming.

Data Base Analyst

Two years' recent experience is required in designing and maintaining data bases, utilising IDS utilities. Knowledge of IDS Internals is desirable.

Teleprocessing Analyst

Three years' experience is required in the area of software support and maintenance for Honeywell's TDS. Knowledge of CRTS/NPS and GMAP programming.

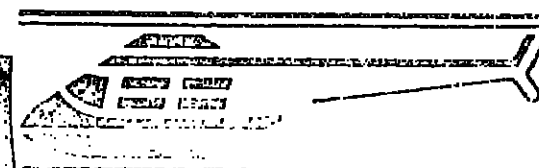
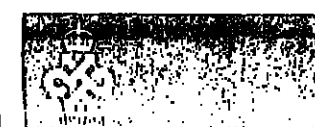
Systems Analyst

Broad experience is required in defining user requirements for the development of data processing systems/program specifications in the area of financial or aerospace engineering and production systems.

As part of the Bell Helicopter International team, experience is not the only benefit you will derive from a two-year contract.

You will also receive a tax-free salary, a housing supplement of £365 per month plus a child allowance of £480 p.a. if accompanied. In addition, generous relocation assistance will help you make the transition from the UK and there are free flights home with leave arrangements.

There is nothing to lose and plenty to gain from spending two years in Iran, so write with brief cv quoting ref. no. 7758 to The Recruitment Officer, IAL, Aeradio House, Hayes Road, Southall, Middlesex. Tel: 01-574 5021.



Bell Helicopter International Bell Helicopter



Wellcome H.N.C. in Computer Studies? or Computer Experience?

This is an excellent career opportunity for a young man or woman, preferably with H.N.C. qualifications in Computer Studies, to gain wide-ranging programming experience within the Scientific Computing Section of The Wellcome Research Laboratories, Berkhamsted.

Main responsibility will be the development of systems to handle data generated by the Laboratory's Toxicology Section on a PDP 11 V03 and to provide a trial/data management system on an IBM 370.

Knowledge of FORTRAN is essential and a knowledge of PDP MACRO would be an advantage. After initial comprehensive training increased involvement in other systems is envisaged.

The Laboratories are part of The Wellcome Group Research and Development and are concerned with veterinary pharmaceuticals and control of insect pests. They are situated on the outskirts of Berkhamsted.

We offer an attractive salary and first-class benefits include generous assistance with relocation expenses, where appropriate.

If you are interested, please write or telephone for an application form, quoting reference LAC 50, to:
A. J. Morris
Site Personnel Officer
The Wellcome Foundation Ltd.
Berkhamsted, Herts.
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CLASSIFIEDS

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HEX PAUSES

Because of pressure on space The Hexadecimal Kid is taking an enforced rest this week.

He'll be back!

Puzzle Answer

The only possible set of triplets is: 123, 147, 158; 168, 248, 258; 267, 348, 387; 369, 468, 789.

STRATHCLYDE

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Candidates will be required to demonstrate a specialist interest in, and relevant experience of, either SYSTEMS ANALYSIS and DESIGN or COMPUTER SCIENCE and should have academic and professional qualifications appropriate to the teaching of their specialisation at degree and post-graduate level.

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Applications are invited from suitably qualified persons with experience in commercial computing and a good knowledge of COBOL for the above post

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Lecturer 'A' - £4029-£7110 Bar - £7638.

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Forms of application and further particulars can be obtained from the College to whom completed application forms should be returned not later than 24th November, 1978.

EDWARD MILLER
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